THE PETROLEUM AND NATURAL GAS TECHNOLOGIST

IN THIS ISSUE

Cracking Process Discussed in Detail.
Page 5.

Refinery Operations on January 1.
Page 23

"Jitney Unit" is Latest Gasoline Plant
Page 17.

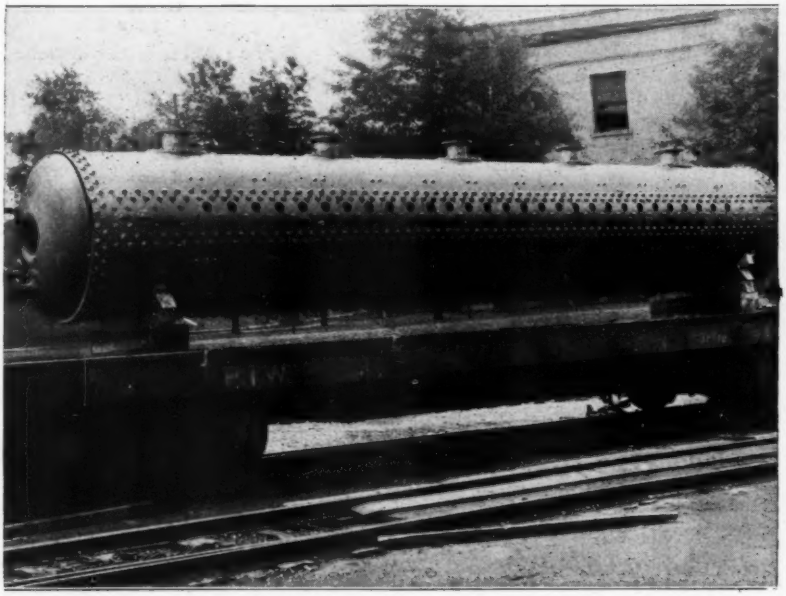
Welded Gasoline Line Successful
Page 10

Vol. 2 No. 1 JANUARY, 1923 $1.00 Per Year

Pure Oil Company's combination absorption and compression plant at Dawes, West Virginia. This is said to be the largest plant of its kind in the world.

XUM

STEEL PLATE CONSTRUCTION



SPECIAL HIGH PRESSURE TUBE

Its dimensions are 31 feet 6 inches long on the shell and the inside diameter is 60 inches. All the way through, in every seam and each rivet, this high pressure boiler tube shows P. I. W. workmanship and accuracy. The above tube is one of a number fabricated by "The TANK BUILDERS" in accordance with original and rigid specifications of one of our customers.

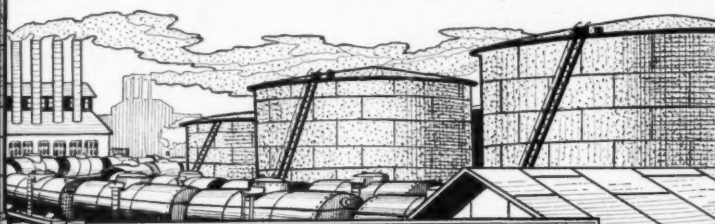
We are constantly augmenting and perfecting the manufacturing facilities at our big plants in Sharon, Pa., and Kansas City, Kansas, to enable us to take care of the growing demand for special steel plate work of this nature—requiring long experience, skilled workmanship and painstaking construction to an ideal.

"The TANK BUILDERS" Build 'Em Right

THE PETROLEUM IRON WORKS COMPANY

Sharon, Pennsylvania

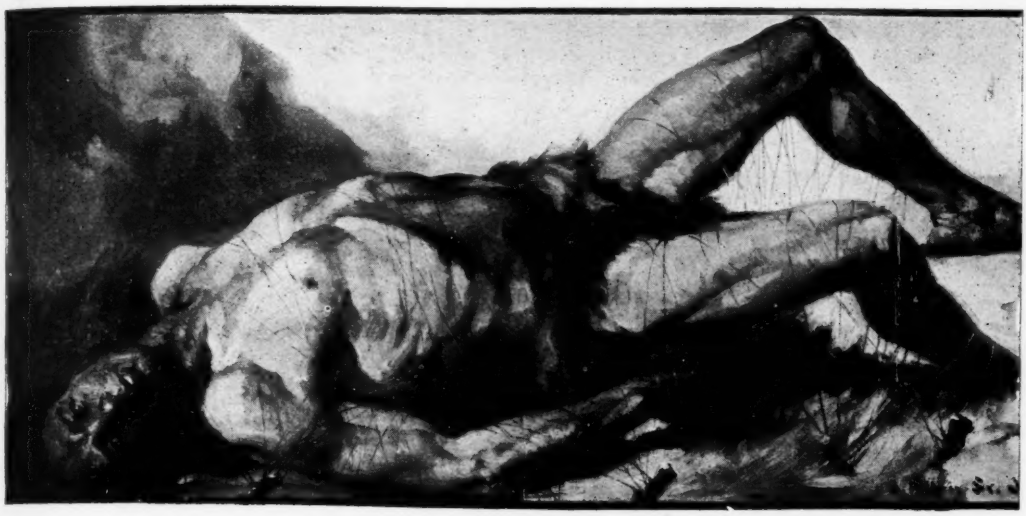
New York St. Louis Tulsa Houston Casper San Francisco Tampico



P. I. W. Steel Plate Products are used in the Petroleum, Gas, Mining, Railway, Iron and Steel, Water Works, Engineering and Allied Industries

P.I.W. STEEL PLATE CONSTRUCTION

P.I.W. STEEL PLATE CONSTRUCTION



Ropes of Hair

Until General American engineers evolved this special insulated type, the economical handling of Natural Gasoline in tank cars had been a vexatious problem over which many an inventor burned the midnight oil in vain.

So apparently simple a thing as a hair felt mattress between a steel inner tank and a steel outer jacket, acting like the vacuum in a thermos bottle, provided the right answer. Thus Natural Gasoline —the unmanageable giant—became another earth product completely enslaved to the will of man.

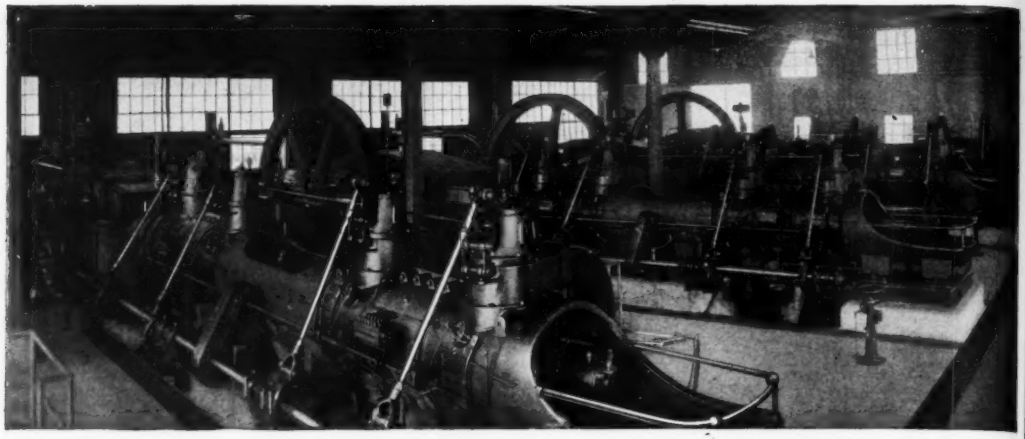
This car transports an extremely volatile and hazardous liquid gas thousands of miles, over burning sands or chilling snows, with an inside, temperature variation of less than 3 degrees, saving the heavy outage occuring in non-insulated tanks. It is one of the many contributions of the General American Tank Car Corporation to better, quicker, safer, cheaper transportation. An engineering triumph immediately reflected by increased efficiency throughout a hundred industries, it embodies the ideal upon which "GATX" service is based.

Whether your problem is equally difficult, whether it involves designing, building, rebuilding, repairing, or leasing, a representative will call upon you at any time, prepared to offer a satisfactory solution.

GATX
GENERAL
AMERICAN

GENERAL AMERICAN
TANK CAR CORPORATION

GENERAL OFFICES
111 WEST MONROE STREET, CHICAGO
SALES OFFICES
New York—17 Battery Place San Francisco—311 California Street



The Fourth Unit Was Another Cooper

Today over 90 per cent of the orders for Cooper Double-acting Gas Engines come from customers who have had years of experience with these engines and know their excellence of design and the high quality of workmanship in their building. Such an example is shown here in the Winchester Pumping Station of the Louisville Gas and Electric Company where three Cooper 485 B. H. P. Horizontal Double-acting Gas Engines have been in operation for nearly three years. This fall, when it was necessary to enlarge the station, the completely satisfactory service given by the old units thoroughly convinced their engineers that the new unit should be a Cooper. The new engine, an exact duplicate of the old ones, with Cooper Plate Valve Compressor Cylinder is now in operation.

When installing compressing equipment, you should profit by the experience of the long list of gas companies who continue to buy Cooper Engines.

The C. & G. COOPER CO.

MT. VERNON, OHIO

Kirby Bldg., Dallas, Texas; 50 Church St., New York

Since 1833 Engineers and Builders

OFFICES AT
1507 First National Bank Bldg., Pittsburgh
423 First National Bank Bldg., Chicago
225 Atco Bldg., Tulsa
426 Douglas Bldg., Los Angeles
212 W. T. Waggoner Bldg., Fort Worth

The REFINER and NATURAL GASOLINE MANUFACTURER
Published Monthly by GULF PUBLISHING Co.
Houston, Texas

For men engaged in the operating branch of the refining and natural gasoline business.

Vol. 2 January No. 1

R. L. DUDLEY..Manager
F. N. WILLIAMS..Editor

Price .....$1 per year

Advertising rates upon application to nearest office.
Copyrighted by the Gulf Publishing Co., 1923

Comparison of Principles Involved in Existing Cracking Processes

Reviewing the nine different classifications under which present systems fall

By Louis Reiss and E. R. Lederer

The development of cracking processes within the past few years has been so great that this one phase of the refining business has probably had more attention than any other particular phase. There are new processes coming up every day, some with merit, and some of such a purely theoretical nature that their practical application is doubtful—but, they show the trend of thought in the oil business.

The two gentlemen who have contributed this article to the Refiner and Natural Gasoline Manufacturer, are both well known and may be termed authorities in the refining business.

Mr. Lederer until recently has been a consulting refinery engineer, and now is vice-president of the Louisiana Oil & Refining Corporation in charge of the refining division of that company. Prior to his being a refinery engineer he was superintendent of the Petroleum Refining Company (Galena Signal of Texas) plant in South Texas, one of the most modern and best built plants in the United States.

Mr. Reiss is a refinery engineer of much experience, and operates a laboratory at Newark, N. J.

We feel very much indebted to these gentlemen for this review of the cracking problem from a scientific standpoint.—Editor.

The term "cracking" as applied to the oil industry means the dissociation of hydrocarbons of high boiling points into hydrocarbons of low boiling points.

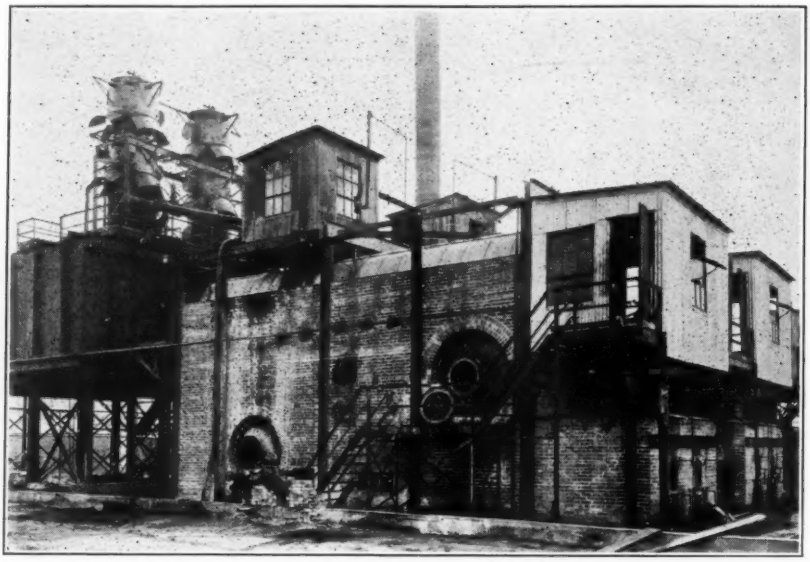
It is necessary at the outset to define certain terms which are to be used throughout this article.

Crude petroleum is a mixture of substances of varying boiling points. These substances are called hydrocarbons, a term which means that they are composed of carbon and hydrogen in definite proportions. These hydrocarbons may be saturated or unsaturated. The two latter terms will be better understood with the following explanation. A saturated hydrocarbon is one to which no more hydrogen can be added. The molecule is saturated with respect to hydrogen and has the general formula C_nH_{2n+2}. In an unsaturated hydrocarbon, there is room for the addition of hydrogen for the molecule to form a saturated hydrocarbon. While there are many cases of unsaturated hydrocarbons we will deal exclusively with what is called the olefin or ethylene group, having the general formula C_nH_{2n}, which indicates that it is necessary to add two parts of hydrogen to the corresponding volume or weight of C_nH_{2n} (the unsaturated) to form the saturated hydrocarbon C_nH_{2n+2}. Where, in the above formula, n=1, we have CH_4 or methane, n=2, we have C_2H_6 or ethane, etc. The more carbon the substance contains, the higher its boiling point. In this article, the hydrocarbons boiling over 500°F. are called the larger or higher hydrocarbons, and they constitute the kerosene, gas oil, fuel oil, etc. of the oil industry, while those boiling below 500°F. are called the lower hydrocarbons, and constitute the gasoline, naphtha, and benzine of the oil industry; and the object of cracking is to obtain the latter from the former. When the high hydrocarbons which make up fuel oil are cracked to gasoline, these hydrocarbons are said to have been dissociated into other (lower) hydrocarbons. This must be thoroughly differentiated from the complete destruction or decomposition of the hydrocarbon. When decomposition takes place, the molecule C_nH_{2n+2} is broken up into carbon and hydrogen, the former depositing in the chamber where the reaction occurs. It will be shown later how important it is to control operations so that dissociation alone takes place. Either a low grade crude as Mexican, or the heavier fractions of a higher grade crude, as North Texas, Mid-Continent, etc., are suitable for cracking.

Exposing higher hydrocarbons in crude oil to heat which is applied in distilling the lower hydrocarbons, causes a partial cracking, but this takes place to such a slight degree as to make it negligible for commercial production. To accelerate or hasten this partial cracking, there were devised many methods which are now to be described.

Cracking Process

It is very difficult to classify the different cracking processes



Battery of Jenkins stills—drums and end still open for cleaning.

now patented or in use because of the overlapping in principles of operation of supposedly diverse methods. In this article it is best to choose the most successful processes and to use these as a basis for arriving at some classification. Not all of the methods mentioned are of commercial value or are actually being used. A description is merely given to indicate the progress and difficulties involved, and the advantages and disadvantages. At best the classification below is a very broad one and is arrived at finally because each process illustrates a principle. Where two patents in the same group are mentioned, it is because of the prominence of both.

The processes may be classified as:

1. Cracking in stills under pressure.
2. Cracking in the liquid phase in tubes under pressure.
3. Cracking in the liquid-vapor phase in tubes under pressure.
4. Cracking by any of the above, using steam.
5. Cracking by any of the above, using fixed gases and hydrogen.
6. Cracking by any of the above, using chemicals.
7. Cracking with the aid of internal heat.
8. Cracking in the vapor phase in tubes under pressure.
9. Cracking by electrical methods.

Pressure Stills

The methods of cracking in stills under pressure (1) is best exemplified by the Burton process. The latter consists in distilling gas oil under a pressure of 100 to 125 pounds per square inch and also condenses the distillate under pressure in equilibrium with the vapor pressure obtaining in the still. They claim to procure a saturated gasoline. There are certain obvious disadvantages in this process. The high pressure is dangerous and creates a certain amount of carbon formation. No effective means have yet been perfected for removing carbon efficiently so that its accumulation is enhanced with resultant burning out of the stills and deaths incident to the fires caused thereby. Such accidents are not uncommon even today. Another drawback of the process is that pressure and temperature cannot be varied independently, as this is really a two-phase system, liquid and vapor. This is best understood by an illustration of the two-phase system, water-steam. At atmosphere pressure, water will only boil at 212°F. as long as there is any steam or water vapor in contact with the water. If the pressure is fixed at 15 pounds per square inch (atmospheric) then the temperature also becomes fixed at 212°F. If the pressure is increased, the temperature is automatically increased to correspond to this new pressure.

However, after all of the water has been turned into steam, then we may fix the pressure and vary the temperature at will, or vice versa. Thus, in a one-phase system like water vapor or steam, the pressure and temperature may be varied independently.

The same is true of oil vapors.

Since the Burton process is a two-phase process, the possibility of producing best results with different grades of distillate and residuum is limited. Another disadvantage of the Burton process is the necessity of careful and delicate operation of frequent shutdowns to remove the carbon, which take about 1-3 of the operating time, and high cost of maintenance and fuel consumption. The Burton process is supposed to obtain about 30% gasoline from the charging stock, which is a regular grade of gas oil. The strongest advantage of this process lies in the fact that the Standard Oil Company has constructed large plants and used the most efficient scientific and business methods in order to bring the efficiency of the process to a point where it becomes commercially valuable.

The Fleming, Isom, Connerty, Coast, Jenkins and other processes are similar to the Burton in equipment and principle of operation.

In Tubes Under Pressure

Cracking heavy oils in the liquid phase in tubes and under pressure is best illustrated by the process of Fenchelle and Perkin in which heavy oil is pumped through pipes heated to 950-1100°F. and kept under a pressure of 750-900 pounds per square inch. The pressure is so high that although the temperature exceeds the critical temperature of some of the hydrocarbons produced, nevertheless they remain dissolved in the main body of the hydrocarbon oils present. The disadvantages of the above process

are obvious. Of about half dozen claims of superiority over the other processes, perhaps most credence may be given to the claim that this method has a selective action on the heavy hydrocarbons. The process is not known to be in commercial operation.

Cracking in the liquid-vapor phase in tubes and under high pressure is accomplished in a commercial way in the Dubbs process by feeding raw oil into one end of a 4-inch coil by means of a pressure pump, and as the oil passes through, it is heated to about 820° F. to 850°F. and is then discharged from the other end into an expansion chamber in which a certain oil level is maintained. The vapors are separated from the refuse oil and condensed under pressure. A pressure of about 120 pounds per square inch is maintained in the entire apparatus. This process has the advantages of continuous operation which reduces the period of shutdowns for cleaning to 7 to 10 per cent of the operating time, simple method of operation, the possibility of cracking residual fuel oil and the good quality of the distillates produced.

Liquid Vapor Phase

Tube cracking in the vapor phase and under pressure is used by Hall and is claimed to be one of the few commercially practicable vapor phase tube methods. The method of operation follows: The oil vapors are cracked in a continuous tube of small size, 1 to 3 inches in diameter. The temperature of the tubes is 914-1112° F., and the pressure is 75 pounds. The product is expended by reducing pressure. The vapors and gases are cooled in this expanded state. Then an endothermic chemical reaction is produced between the gases and vapors by compressing them under adiabatic conditions in compressors to a pressure of 100-123 pounds together with all the gas that has been produced. In this operation, heat is absorbed by the substances but the external temperature conditions remain the same. The product is then clarified and deodorized by extracting the yellow resinous colloidal matter which it contains by distilling with a small amount of Fullers earth. The feature of this process is the secondary compression which would have a tendency to form gasoline from some of the gases and the liquid, and also to dissolve some of the gases in the liquid. The process claims the advantage of flexibility in varying conditions of temperature and pressure.

An improved method of cracking in the vapor-phase has been devised and placed in commercial use by Louis de Florez Light gas oil distillate is pumped continually through a system of 1½-inch preheater tubes, the vapors kept at 1000 degrees F. and 200 pounds pressure and cracked in 1-inch tubes from where they expand into an expansion tube; the pressure is then gradually released to 75 pounds and the vapors condensed at atmospheric pressure. The "synthetic" product from this process has to be rerun and yields from 25 to 30 per cent gasoline of a highly unsaturated character. In order to be acid treated it has to be mixed with about 15 per cent of blending naphtha. Like all vapor-phase methods this process is limited to operation on light, carefully cleaned, gasoil and the capacity of each unit is rather small for operation on a large scale.

The Rittman process is another illustration of tube cracking in the vapor phase. It consists essentially in suddenly gasifying the material to be treated in the absence of any liquid and under pressure of at least six atmospheres, and then condensing the resulting hydrocarbons that will condense at a temperature above 86°F. It is strictly a gas phase process. This process is simpler than the Hall but probably not as effective in producing a good quality of gasoline. It is essentially a process for producing what are known as aromatic hydrocarbons such as toluol, benzol, etc., rather than the paraffin hydrocarbons such as gasoline. There is only one commercial unit of this process in operation.

Use of Steam.

The Greenstreet process is one of about thirty methods that propose the use of steam in various ways, with or without any catalytic materials to bring about effective cracking. The general theory of this procedure is that the steam is decomposed to yield hydrogen which is supposed to saturate some of the cracked oil. This hydrogen may be obtained from the steam by the use of metallic oxides or red hot metals, such as iron oxide or nickel, respectively. The Greenstreet process involves the continuous pumping of petroleum into flat coils of long pipes with 'U' bends, under heat and pressure, and in the presence of steam. Under such conditions, the petroleum breaks down. The steam pressure is 100 pounds and the oil is fed at a pressure of 50 pounds. This process is not used to any great extent or with very good results.

The process of Planes, Ltd. and Thompson is not an important one, but illustrates principles that are incorporated in other successfully commercial processes, and also provides ideas along which research can be carried on. The above distill petroleum oils under pressure while agitating the liquid in the still with finely divided nickel. Hydrogen is simultaneously supplied under pressure, which, in the presence of nickel, is said to combine with the unsaturated hydrocarbons produced by the heat treatment. The possibilities of this process are very great, but for reasons not published, it has not attained success.

A process which has attracted considerable attention for some time and given good commercial results is the Cross process.

Originally intended as a vapor-phase process Dr. Cross changed the application of heat directly to the liquid phase, using excess pressure in order to maintain an equilibrium between the liquid phase gasoline with its vapor phase.

Preheated oil is forced through a series of heavy 4-inch tubes and passes to an expansion chamber, where the rearrangement of the hydrocarbons takes place and carbon deposited. The condensed vapors produce a "synthetic" product which has to be rerun like other pressure distillates. The cracking temperature maintained is about 875°F. and the pressure applied in the tubes and expansion chambers range from 600 to 750 pounds per square inch and is reduced in the condenser coil to 75 pounds.

Naturally especially constructed heavy equipment with a large factor of safety has to be used. An average yield of 30 per cent finished gasoline from the gasoil-charge can be expected.

The McAfee process, controlled by the Gulf Refining Company is the most prominent of the cracking processes in which the chemical phase is the most important part of the procedure. McAfee states that he obtains a substantially complete catalytic conversion of higher boiling petroleum oils into lower boiling oils, and particularly converts high boiling oils, distillates, and residues into gasoline "solvent" and kerosene, or into gasoline alone by heating the high boiling oil in a slow and regular manner in the presence of Aluminum while a current of chlorine or hydrocloric acid gas is introduced into the oil. The low boiling products of the reaction and the hydrogen chloride produced are removed continually—during the progress of the reaction, the volume of the oil being kept constant by addition of fresh oil. The complex molecules are broken down into simpler ones. A saturated gasoline is said to be produced. There seems to be no reason why this method should not develop into a very im-

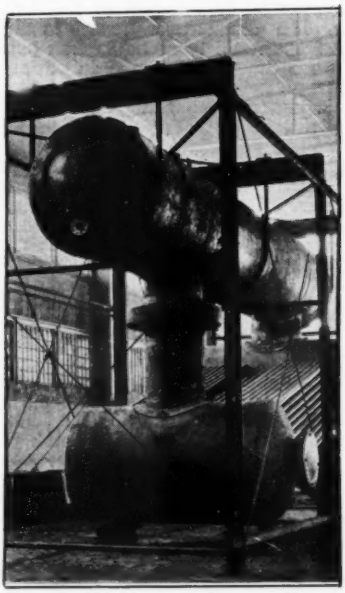
portant one from a commercial point of view if anhydrous aluminum chloride can be manufactured at a reasonable cost or the costly chemicals recovered in an efficient cheap manner. It does not involve high pressure like other processes, nor does it demand high temperatures.

The Strache and Porges process is mentioned for the same reason as the Planes, Ltd. patent is. It possesses good potential value if developed. This method is one of cracking with the aid of internal heat. By internal heat is meant heat derived from a combustion, restricted or complete, or both, of a part of the hydrocarbon material being treated. Strache and Porges conduct vapors of heavy hydrocarbons mixed with steam over an oxygen transferrer at a comparatively low temperature. This is said to give only a small quantity of gas. The oxygen transferrer is an oxide of a suitable metal as iron oxide. The oxygen effects the combustion of a small amount of hydrocarbon which is advantageous as it gives heat energy and in addition burns up any carbon formed. While it is improbable that the process is used, the principles may be adopted on certain occasions.

By Electrical Methods.

Cracking by electrical methods may best be exemplified in the Stevens process. In this process, either crude oil or heavy hydrocarbons such as fuel oil are distilled under atmospheric pressure The vapors pass through a separator in which mechanically entrained particles of oil are separated from the vapors and passed back into the still. The vapors are cracked in the presence of a catalyst at much lower temperatures, the catalyst being kept clean by the bombardment of an electric spark from a high tension discharge. By maintaining the dephlegmator at a temperature corresponding to the boiling point of gasoline, only gasoline vapors will pass on to the catalyzer or saturating chamber, while any higher boiling hydrocarbons will pass back into the still. The vapors, before passing into the catalyzer chamber, are freed of their sulphur content by being subjected to the action of chemicals. After leaving the catalyzer, the hydrocarbon vapors are condensed.

The outstanding feature of the electrical method as compared with all other methods of cracking oils, is its conservation of energy while the others must result in a tremendous waste in heat energy. Heat can be converted into work, whether this work be mechanical, chemical, or electrical. However, it is known both practically and thermodynamically that heat cannot quantitatively be converted in to useful work. As an illustration of this, it may be stated that the average maximum efficiency of a steam engine is only about 12 per cent. The Stevens process features the utilization of electrical energy for chemical action, and thus utilizes the only form of energy that can be converted into useful work to the extent of almost 100 per cent when properly operated. This chemical action is constituted in the aforementioned action of the spark activating the catalyst which simultaneously causes a fixation or association of the carbon with the hydrogen. It is only incidently that the Stevens process utilizes electrical energy for heating purposes as the control of temperature is very exact in this way. At the present time, the main object of the Stevens process is to determine the most favorable conditions for the maximum yields of gasoline. In common with the Hall and Rittman processes, it resolves itself into a vapor phase cracking process, except that in place of the two factors, temperature and pressure, temperature and electrical energy are used. In the Stevens process, the hydrocarbon material is at all times fully expanded so that if there is a leakage of joints or giving way of the retainer, no danger results. This, of course, is not true of the pressure processes described above. Through the ingenious spray and swirling effect in the cracking chamber, Stevens obtains a greater speed of reaction and a very intimate exposure of the vapors to be highly activated catalyst. As found by several investigators, the comparative sudden expansion effected by this spray and swirl also aids in dissociation.



Jenkins still set up in shop to be tested, showing the passage tubes.

Ideal Process.

The ideal cracking process would be one in which high hydrocarbons are converted into low boiling hydrocarbons with the formation of only a slight amount of fixed, permanent, or non-condensible gases and carbon. The shortage of the supply of good crude oil will eventually cause this country to resort to cracking processes that need not be ideal as long as commercially efficient. Carbon is formed to a large extent in the Burton, Dubbs, Rittman, Cross and Hall processes, although the latter claims to keep his in suspension in the oil, as does Fenchelle and Perkin. No carbon is found in the McAfee, Strache and Porges, and the Stevens processes when properly operated. Strache and Porges depend upon internal heat to rid themselves of the carbon deposit. This principle is also utilized in electric processes whereby any possible residual carbon remaining is used up in a slight combustion to supply the favorable internal energy which accelerates the formation of hydrocarbon gases and vapors so necessary to maintain the equilibrium. The type of heat due to this burning also supplies a quantity of energy which might be called 'priming' or 'boosting' energy and also a quantity of fixed gases that again aid in establishing equilibrium in the system. This question of equilibrium is very important and will therefore be explained in greater detail. The hydrocarbon vapors and the non-condensible or fixed gases form together a system which is in equilibrium with the uncracked vapors, so that if either the vapors of the cracked oil or the fixed gases are withdrawn from the system, the equilibrium is disturbed and is only restored by replenishing the withdrawn substances. Thus, if we have the system high hydrocarbon-low hydrocarbon-fixed gases, and the latter is withdrawn, more of the high hydrocarbons must break up to yield the gases in order to restore the equilibrium. It is very important rather to retain these fixed gases in the reaction zone and to keep removing the low hydrocarbons. In such a case the high hydrocarbons must break up to yield low ones in order that the equilibrium be satisfied. Hydro-

(Continued on Page 12)

After Twenty-five Years

No. 1 Experiences With Homestead Valves

CHEBOYGAN, MICHIGAN.

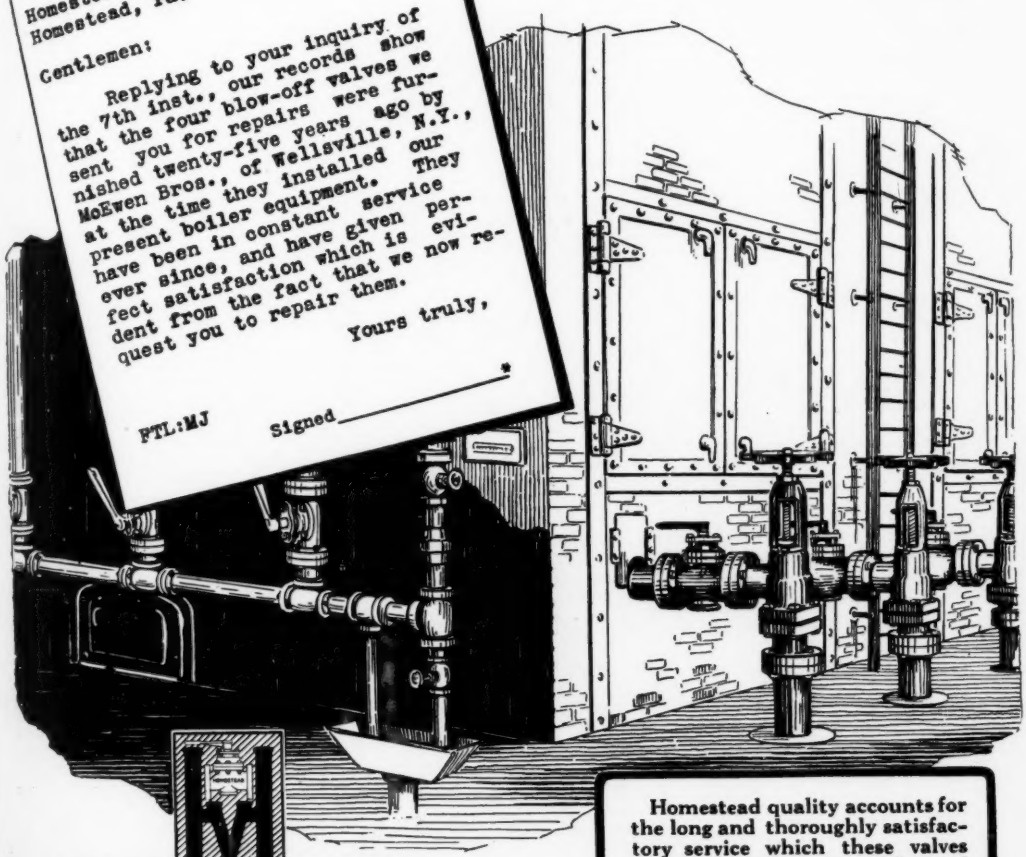
Homestead Valve Mfg. Co.,
Homestead, Pa.

Gentlemen:

Replying to your inquiry of the 7th inst., our records show that the four blow-off valves we sent you for repairs were furnished twenty-five years ago by McEwen Bros., of Wellsville, N.Y., at the time they installed our present boiler equipment. They have been in constant service ever since, and have given perfect satisfaction which is evident from the fact that we now request you to repair them.

Yours truly,

FTL:MJ Signed_____*



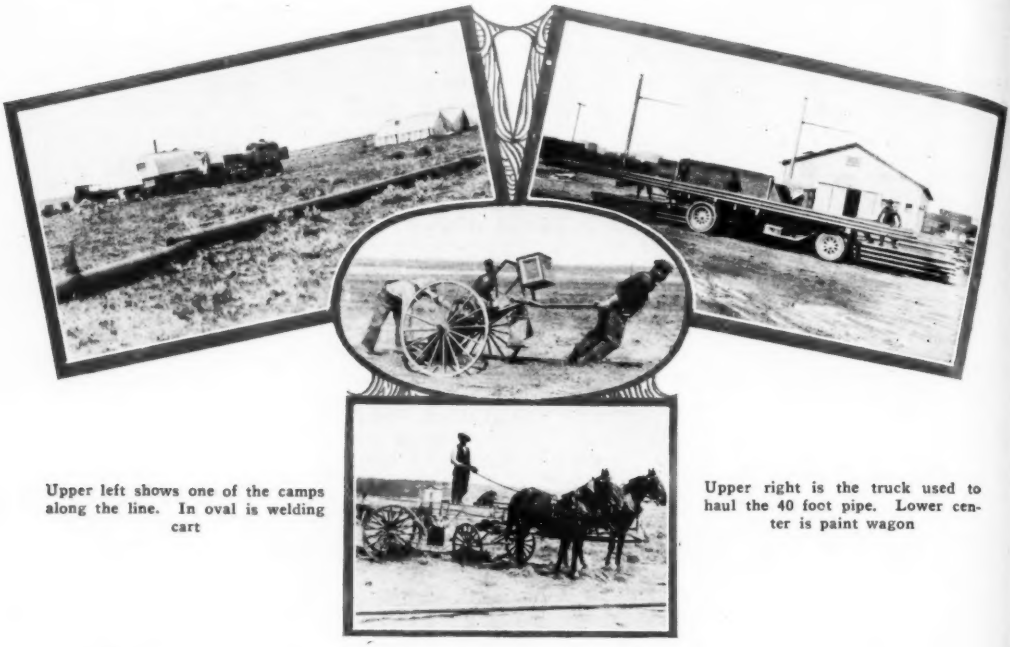
Other Interesting Experiences from Homestead users are solicited. In return for a letter covering *your* experience we will mail you a handsome leather pocket-size note-book with renewable pad.

*Name Sent on Request

Homestead quality accounts for the long and thoroughly satisfactory service which these valves render. Design, materials, and workmanship, are all of the highest standard.

Homestead Valve Mfg. Co.
138 Sixth Ave. Homestead, Penna.

HOMESTEAD



Upper left shows one of the camps along the line. In oval is welding cart

Upper right is the truck used to haul the 40 foot pipe. Lower center is paint wagon

Midwest Uses Welded Pipe in Gasoline Line

Welding work explained by superintendent; line built to stand 1200 pounds pressure

Casper, Wyo.—In the construction of a 4-inch pipe line from the Salt Creek field, where two natural gasoline plants are operated, the Midwest Refining Company selected the welded joint.

Extra heavy pipe in 40-foot lengths, with chamfered ends, was ordered for the line. It was constructed to stand a pressure of 1200 pounds.

Previously the Midwest company had constructed a 3-inch welded line from Salt Creek to Casper. With the addition of a second plant and its increased output, the other line became necessary.

To offset evaporation losses of pumping under 500 pounds pressure and into open tanks at Casper, the raw gasoline is blended with naphtha at Salt Creek. A topping plant is maintained at Salt Creek to run the naphtha for blending before the run. This method has been successful in eliminating the big part of evaporation loss.

The work of welding the line was told by H. A. Yost, foreman in charge of the work, in the December issue of the Midwest Review, as follows:

"In preparation for the increase in production of casinghead gasoline from the new compression plant in Salt Creek, a new four inch welded line was laid from Salt Creek to Casper.

H. A. YOST
Foreman in charge of construction for Midwest Refining Company

"Forty miles of extra heavy pipe, capable of standing pressure of 1200 pounds, was used in its construction. In order to reduce the number of joints, this pipe was ordered in 40-foot lengths, and chamfered on the outside to facilitate the welding.

"It was necessary to rig special frame work on the trucks which strung this pipe along the line. As will be noticed in the accompanying illustration, the pipe overhung the truck on both ends for considerable distance. The stringing was completed well in advance of the welding, in order that there would be no delay, after the actual work of pipe laying was started.

"The welding began in the forepart of April at the Gas Plant, working toward Casper. On the 19th of April the work had progressed southward far enough to warrant the erection of a line camp, which consisted of five bunk tents, two sheep wagons which were used as kitchen and dining

room, a trailor which served as an additional dining room and a second trailor which carried a water tank to furnish the supply of fresh water for use in the camp. The crew consisted of about 35 men: welders, welders' helpers, painters, truck drivers and teamsters.

"In order to facilitate transportation the gas and oxygen tanks light were mounted on two-wheeled carts rendering them very mobile. The equipment was of the Oxweld type.

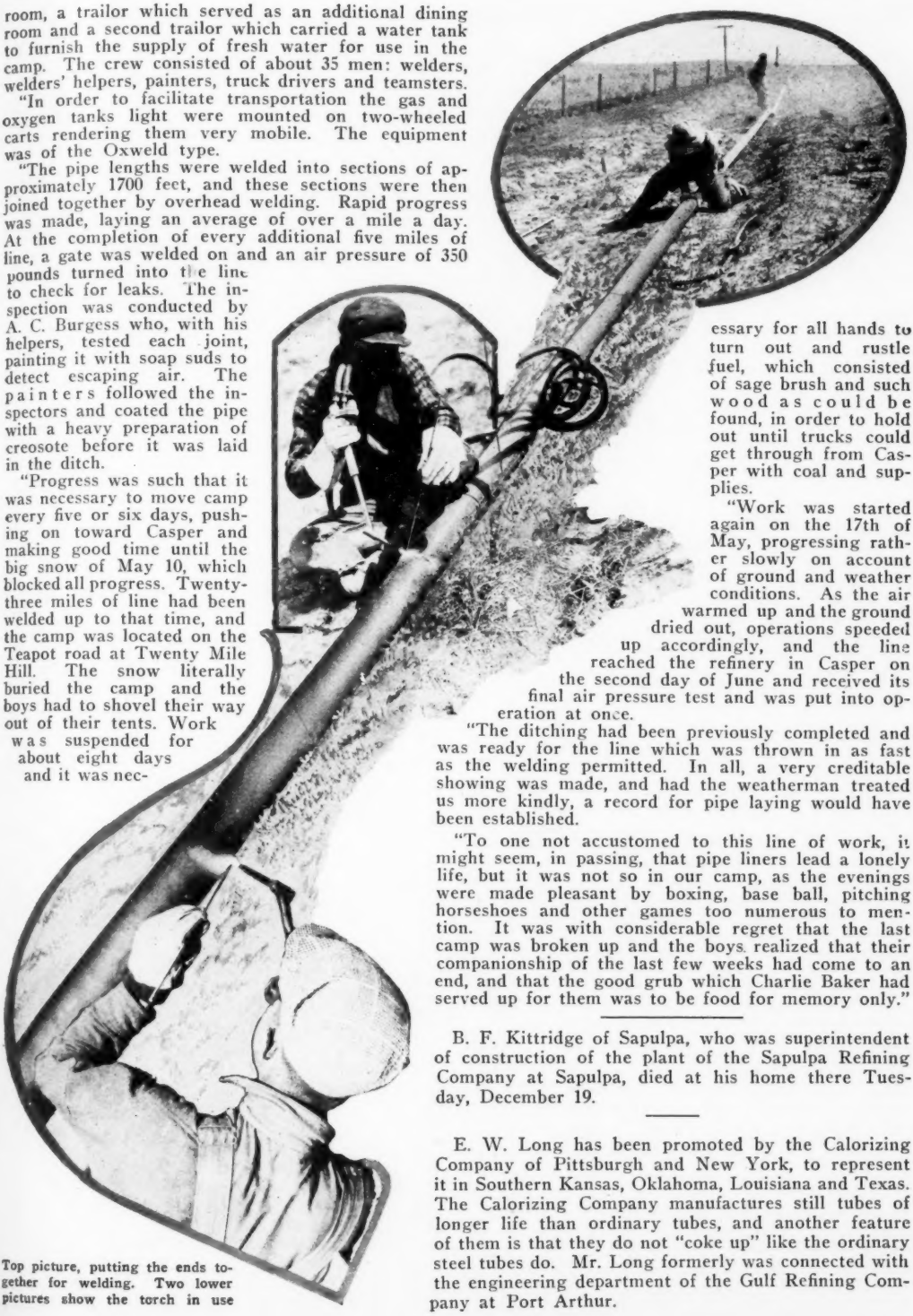
"The pipe lengths were welded into sections of approximately 1700 feet, and these sections were then joined together by overhead welding. Rapid progress was made, laying an average of over a mile a day. At the completion of every additional five miles of line, a gate was welded on and an air pressure of 350 pounds turned into the line to check for leaks. The inspection was conducted by A. C. Burgess who, with his helpers, tested each joint, painting it with soap suds to detect escaping air. The painters followed the inspectors and coated the pipe with a heavy preparation of creosote before it was laid in the ditch.

"Progress was such that it was necessary to move camp every five or six days, pushing on toward Casper and making good time until the big snow of May 10, which blocked all progress. Twenty-three miles of line had been welded up to that time, and the camp was located on the Teapot road at Twenty Mile Hill. The snow literally buried the camp and the boys had to shovel their way out of their tents. Work was suspended for about eight days and it was necessary for all hands to turn out and rustle fuel, which consisted of sage brush and such wood as could be found, in order to hold out until trucks could get through from Casper with coal and supplies.

"Work was started again on the 17th of May, progressing rather slowly on account of ground and weather conditions. As the air warmed up and the ground dried out, operations speeded up accordingly, and the line reached the refinery in Casper on the second day of June and received its final air pressure test and was put into operation at once.

"The ditching had been previously completed and was ready for the line which was thrown in as fast as the welding permitted. In all, a very creditable showing was made, and had the weatherman treated us more kindly, a record for pipe laying would have been established.

"To one not accustomed to this line of work, it might seem, in passing, that pipe liners lead a lonely life, but it was not so in our camp, as the evenings were made pleasant by boxing, base ball, pitching horseshoes and other games too numerous to mention. It was with considerable regret that the last camp was broken up and the boys realized that their companionship of the last few weeks had come to an end, and that the good grub which Charlie Baker had served up for them was to be food for memory only."



Top picture, putting the ends together for welding. Two lower pictures show the torch in use

---

B. F. Kittridge of Sapulpa, who was superintendent of construction of the plant of the Sapulpa Refining Company at Sapulpa, died at his home there Tuesday, December 19.

E. W. Long has been promoted by the Calorizing Company of Pittsburgh and New York, to represent it in Southern Kansas, Oklahoma, Louisiana and Texas. The Calorizing Company manufactures still tubes of longer life than ordinary tubes, and another feature of them is that they do not "coke up" like the ordinary steel tubes do. Mr. Long formerly was connected with the engineering department of the Gulf Refining Company at Port Arthur.

Process for Eliminating Offensive Odors in Gasoline Granted Patent

Washington, D. C., Jan. 15.—A process which seeks to eliminate offensive odors in gasoline, and which has as a further purpose the destruction of coloring matter originally present in gasoline, has been granted a patent in the United States to Albert Ernest Dunstan of Sunbury, England. This patent was described in a few words in the December issue of The Refiner and Natural Gasoline Manufacturer, but its details are interesting enough to warrant their publication at length.

The following specifications are noted in the application for patent:

This invention relates to a process of refining benzine, kerosene or other distillates from petroleum, shale oil and the like by the removal therefrom of the sulphur compounds such as organic sulphide, polysulphides and hydro-sulphides they may contain.

This invention particulary relates to the refining of oil from the removal of bad odors, to destroy any coloring matter originally present and to eliminate or prevent development of acid or corrosive products. So far as the causes of these objectionable properties are known, organic compounds of sulphur are chiefly responsible. The precise structure of all the sulphur compounds present in petroleum distillate and the like is not known, but I find that all the sulphur in these oils is amenable to treating to this invention.

According to the invention the liquid hydrocarbon is subjected to treatment with an alkaline solution of a hypochlorite, whereby the sulphur compounds contained in the liquid hydrocarbon are oxidized and bodies produced that readily pass into and are removed with the lye.

According to the invention, moreover, the treatment is effected in the presence of an excess of alkali.

The invention comprises the features which are hereinafter described.

The invention may be carried into effect in any suitable form of electrolytic apparatus. For example, an iron or steel vessel of upstanding cylindrical form may be employed suitably earthed and carbon or graphite anodes may be used, and heat may be applied to the vessel in any suitable or convenient way. The liquid hydrocarbon may be poured into the electrolyte and the electrolysis may proceed while the electrolyte is actively stirred by a stirrer. Heat may be applied to the vessel so that the treatment may take place at the optimum temperature. I have found a temperature of 120° F. effective.

Any suitable hypochlorite may be used such as sodium hypochlorite, with the addition of free alkali.

The presence of free alkali has the effect of preventing corrosion of the vessel, of inhibiting chlorination of hydrocarbons, of stabilizing the hypochlorite and of assisting in the removal of the products of the treatment which result mainly from the oxidation of the organic sulphur compounds originally present in the liquid hydrocarbon treated.

The alkaline solution of a hypochlorite may be produced in an apparatus external to the mixer in which the operation proceeds. In fact, the solution may be prepared by any of the known methods, such as electrolysis of a salt solution in special cells for the production of hypochlorite, by passing liquid chlorine into a solution of an alkali such as caustic soda or milk of lime, or by dissolving bleaching powder in sufficient water to produce a solution of the proper hypochlorite content and alkalinity.

As has been pointed out above, the presence of free alkali renders the solution free from uncombined chlorine, and inhibits the chlorination of the hydrocarbon. Liquid hydrocarbons refined according to this invention are chlorine free for all practical purposes.

The oil to be treated should be analyzed so as to discover its sulphur content. For each unit amount of sulphur there should be provided at least one unit amount of oxygen resulting from the decomposition of hypochlorite. The amount of free alkali should at least be of the order of one tenth of one per cent concentration. The concentration of the hypochlorite should be at least 25 hundredths per cent normal. The current density in the electrodes may be from .15 to .40 amperes per square centimeter. The duration of treatment should be determined by test with each individual oil.

In cases where the oxidized sulphur compounds are of high molecular weight and are relatively insoluble in alkali, they may be removed from solution in the refined oil by means of filtration through animal charcoal, dehydrated alumina, fuller's earth or any suitable dechlorizing agent.

Before treating hydrocarbons containing hydro-sulphides or mercaptans, the hydrocarbon may be first treated with caustic soda so that it may be substantially deprived of these bodies before treatment according to the invention.

Comparison of Principles Involved in Cracking Processes

(Continued from Page 8)

gen added for saturating purposes also concentrates the fixed gases again stimulating the formation of low boiling hydrocarbons. The direct passage of the hydrogen through the system is in contrast to the formation of hydrogen in the system as used in the Greenstreet and other processes. The disadvantage of decomposing steam to obtain hydrogen, is the vast amount of heat necessary. In various experiments conducted for development of cracking processes it was found that if oil was cracked in the presence of an excess of hydrogen and other permanent gases, little of the hydrogen contained in the oil splits off in a free condition. Thus, addition of extraneous hydrogen prevents to a certain extent the formation of the unsaturated hydrocarbons of the olefin group. Hall has proved that properly cracked gasoline even of the olefin group gives as good mileage as gasoline distillate since the former burns more slowly. With more hydrogen present than is required by equilibrium conditions, the natural tendency is for hydrogen to combine.

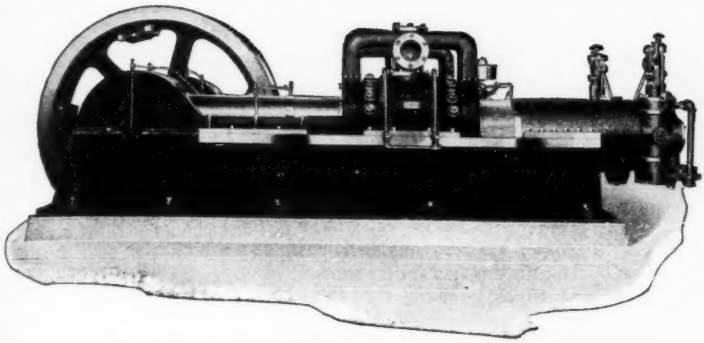
Cracked Gasoline

A cracked gasoline is just as good as gasoline obtained by any other method. As stated before, it burns more slowly and its explosive energy is distributed uniformly throughout the entire stroke of the piston. In large scale production, the heat of vaporization, the heat of flue gases, etc., can be utilized thoroughly.

The process of Planes, Ltd. and Thompson which combines the cracking and saturating operations in one, as mentioned earlier in this report, has merit on the theory that the time to saturate is when the molecule is most complex or least stable, and this is immediately on cracking. However, Ellis claims that compounds like members of the olefin and paraffin groups will become more stable by subjecting them to decreasing temperatures before passing to the condenser.

XUM

THE NEW ENCLOSED TYPE



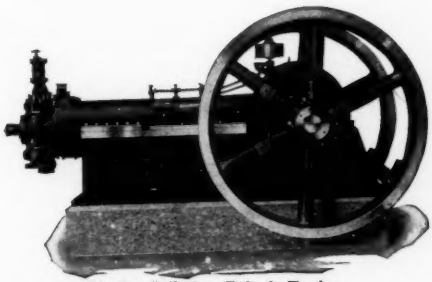
Direct Gas Engine Driven Vacuum Pump, Two Cylinder

Watts-Miller Gas Engines and Direct Gas Engine Driven Compressors and Vacuum Pumps

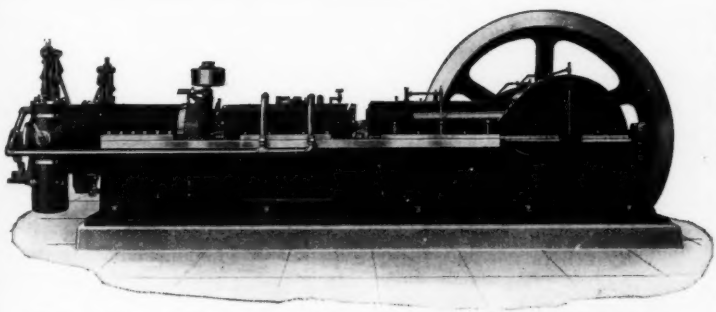
Pat. June 22, 1897; Oct. 6, 1914; April 13, 1915

High Efficiency Gas Engines, Compressors, and Vacuum Pumps for Power Plant Equipment

Sizes from 25 to 400 h. p.



Single Cylinder Belted Engine



Direct Gas Engine Driven Compressor, Two Cylinder, Single or Two Stage

Compressors particularly adapted to casing-head gasoline plants, gas pumping plants, and compressed air installations, in single and 2-stage machines to operate on practically all intake and discharge pressures. Continuous circulating filtering automatic oiling system.

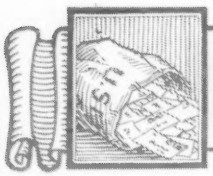
The Miller Improved Gas Engine Company

SPRINGFIELD, OHIO

DISTRIBUTORS

Tulsa, Oklahoma, Office and Warehouse,
323 North Cheyenne Ave.,
Tulsa, Okla.

Woodlief-Greenwood Engineering Co.,
219 Cotton Exchange Building,
Dallas, Texas



LETTERS TO THE EDITOR

Who Wants to Fill This Bill?

We are in receipt of the following letter from a subscriber, and will be glad to forward answers from any manufacturing concern:

Mr. R. L. Dudley, Mgr.,
The Refiner and Natural Gasoline Manufacturer,
Houston, Texas.

Dear Mr. Dudley:

Will you kindly advise me where I can secure some steel tape lines for gauging oil tanks. Also am interested in the purchase of a steam-driven electric generator of from fifteen (15) to twenty (20) K. W. capacity and some steel fittings: ells, tees, flanges, etc., of all sizes.

Later on I wish to purchase two regulating valves for steam pumps; 2½-inch fire hose, standard fire hydrants, electric lighting equipment, one gas mask of the air type in which the wearer breathes the outside air by means of a long flexible tube.

There are other things which I will ask you about later and assure you your kind information covering these subjects will be much appreciated and will expedite our purchase of these materials very much.

What of the Small Independent Refiner?

The following letter has been received from a refinery engineer.

Modern industry has for its motto, "The greatest good for the most people." Not every organization within an industry has an economic right to exist under this motto. Such a business may in itself be profitable but when the economics of the whole industry or the nation is taken into consideration, such a business may be a decided menace. Perhaps if there were one such business it would count for but little but if one hundred exist they must be considered.

The claim is now made that the price of gasoline is so low that the small refinery organization is being put out of business. Is the small refinery which is headed by one who knows his business, which is run economically, which sells at legitimate prices, which has a real territory to serve and serves it as well or better than its competitor, which is not competing for crude to the detriment of crude price conditions; is such a refinery being put out of business? Such an organization may be having a hard time but they will survive. They are an economic necessity.

There is another class of refinery, started as a speculation or to take advantage of flush production. They sell at cut-throat prices, in any territory which they can. Their products are inferior. They compete for crude and are able to do so because they market inferior products. Hundreds of such refining organizations rise and disappear. They disrupt the industry by disorganizing price conditions and by serving the public badly. By causing a loss to their stock holders, they make it more difficult for the legitimate refiner to secure financial support. Such an organization has no economic right to exist and if the price of refined products is so low that they cannot exist, it will be "to the greatest good for the most people."

No industry can survive continual losses in competition with capital losses. Any industry has the right to do anything in its power to prevent a portion of its business being taken at the expense of the investments made by the public for which the public gets no returns in service or profits.

The Refiner and Gasoline Manufacturer is in receipt of a letter from a refinery superintendent wanting to get in touch with the authors of an article in the October issue on "Gum Forming Constituents in Gasoline." This article was written by N. A. C. Smith, Petroleum Chemist of the United States Bureau of Mines, Experimental Station, Pittsburgh, and M. B. Cook, assistant refinery engineer of the Bureau of Mines.

In response to a letter from the editor of The Refiner and Natural Gasoline Manufacturer, Mr. Smith writes from Pittsburgh that the only information the Bureau now has available is that contained in the article printed in the October issue, but that a series of samples of gasoline were placed in storage about a year ago and tests are being made on these at intervals, but it will be at least another year before another report will be made upon this subject.

Bolene Refining Company Increases Capital Stock

Oklahoma City, Okla.—The Bolene Refining Company of Enid has filed an amendment to its charter increasing the capital stock from $200.000 to $1,000,000.

Bristow, Okla.—The Transcontinental Oil Company's six-still skimming plant, near Bristow, is now operating and runs will be increased until the plant has a daily charging out-put of 5000 barrels.

C. C. Durkee, superintendent in charge of the Fort Worth refinery of the White Eagle Oil and Refining Company, visited the home offices of his company in Kansas City last week.

---

and thus the hypochlorite economized.

I claim:

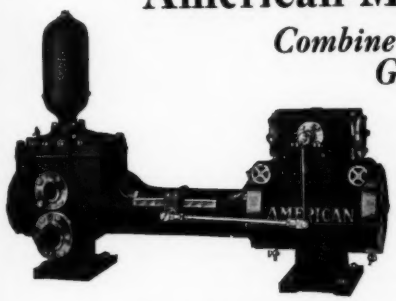
1. A process for refining liquid hydrocarbons containing sulphur compounds, comprising subjecting said hydrocarbons to treatment with a solution comprising a hypochlorite in concentration at least 0.25 normal and free alkali in concentration at least one-tenth of one per cent.

2. A process for refining liquid hydrocarbons containing sulphur compounds, comprising said hydrocarbons to treatment with a solution consisting of a hypochlorite and free alkali without introducing chlorine into the liquid hydrocarbons.

3. A process for refining liquid hydrocarbons containing sulphur compounds, comprising subjecting said hydrocarbons to treatment with an alkaline solution of a hypochlorite in proportion to provide about one unit of oxygen from decomposition of the hypochlorite to each unit of sulphur in the liquid hydrocarbon.

American-Marsh Refinery Pumps

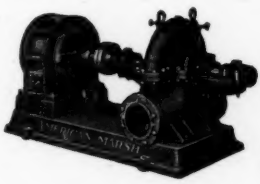
Combine High Efficiency With Great Durability



American-Marsh Pumps meet the demand for strictly high grade high efficiency units where absolute reliability over a long term of years is essential. Their heavy, rugged construction with extra wide passages and large valve areas make them ideal for handling oil and other heavy liquids.

The steam pumps are fully bronze fitted. Heavy cradle yokes are furnished between steam and water ends instead of tie rods, making expensive drip pans unnecessary.

American-Marsh Centrifugal Pumps are made in many different types, some of them especially designed for refinery work. Capacities range from 5 to 5000 gallons per minute and heads up to 250 feet.

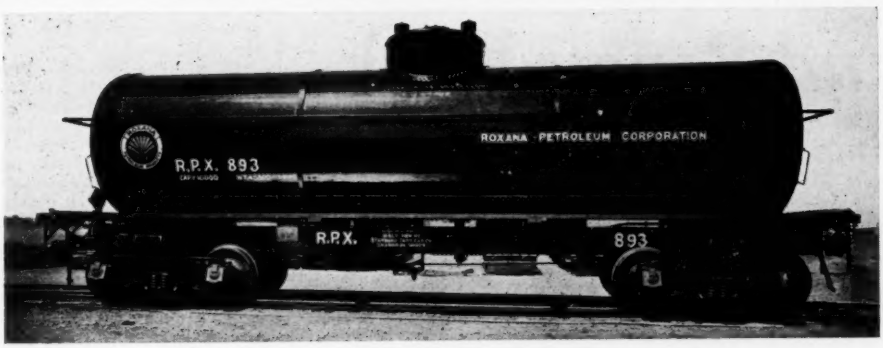


The line includes:

Boiler Feed Pumps
Vacuum Pumps
Jet Condensers
Deep Well Engines
Air Compressors
Centrifugal Pumps
Oil Pumps
Acid Pumps

Write for General Catalog

American Steam Pump Co., Battle Creek, Mich.



(Courtesy Roxana Petroleum Corporation)

PAINTS

For Every Purpose

We specialize in Refinery, Tank and Tank Car paints of all kinds.

Your inquiries and orders will receive prompt and courteous attention.

AMERICAN PAINT & SUPPLY CO.

Manufacturers of Paints

Factory and Office—DALLAS, TEXAS

Natural Gasoline Industry Shows Large Increase in Rocky Mountain Territory

Casper, Wyo.—Great strides have been made in the natural gasoline industry in the Rocky Mountain region despite the fact that it was only recently introduced, as compared to other fields of the United States. There are some 12 to 15 plants for the recovery of gasoline from natural gas now operating in this territory, with a number of others nearing completion.

Midwest Refining Company.—Situated in the Salt Creek field, Natrona County, 42 miles north of Casper. It is fed by gas line connected with wells in the central portion of the field. The plant is now the largest of its kind in the world, running more than 20,000,000 cubic feet of gas daily. The gasoline is run through two 2-inch welded lines to the refineries at Casper where it is blended with low grades of refinery gasoline. Plans now being put into action call for an enlargement to this plant which will increase the capacity to 30,000,000 to 40,000,000 cubic feet daily. The contract is to be let this month, calling for an expenditure of nearly $500,000. This is in addition to the enlargement program completed last summer which made it the largest plant in the world.

E. T. Williams Oil Company.—Bessemer compressor plant in Salt Creek field, handling gas from holdings of this company. Enlargements during the last year make its daily capacity about 5,000,000 cubic feet of gas daily. Plans call for the laying of a 3 or 4-inch line by which gasoline will be conveyed to the Texas Company refinery near Casper for blending.

Wyoming By-Products Company.—In the Salt Creek field. It operates on gas from the wells of the Ohio and New York Oil Companies' wells. There is an absorption plant which has a capacity of 7,000,000 to 10,000,000 cubic feet of gas daily.

Producers & Refiners Corporation.—Gasoline absorption plant near Standard refineries at Casper, to be placed in operation early in 1923. Was run for small period at close of 1922, but is now shut down for adjustments. Has capacity of about 30,000,000 cubic feet of gas daily. Gets gas from Producers & Refiner's wells in Ferris-Lost Soldier-Mahoney district through Producers & Refiners-Midwest pipe line.

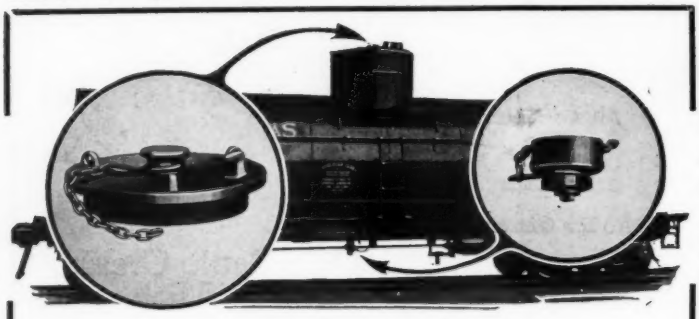
Producers & Refiners Corporation.—Located at Riverton, completed at close of 1922. Will be placed in regular use early in 1923. Handles 5,000,000 cubic feet of gas daily. An absorption plant. Planned to have carbon black works on pipe line, between absorption plant and Sand Draw field, which is connected with Riverton by pipe line.

Ohio Oil Company.—Located in the Grass Creek oil field. Gassy product which has to be blended with topping from field crude is turned out before shipment through 3-inch line to loading racks at Chatham on Burlington railroad, 28½ miles away. The mixture goes through the line at about 65 per cent fluid.

Armstrong Gasoline Oil Company of California.—Is located in Rock Creek field. The plant uses about 2,500,000 cubic feet of gas daily from the wells of the Ohio Oil Company. The new process of distillation that does not require any steam is employed. It averages approximately 400 barrels weekly. The product is piped in a 2-inch welded line to loading racks at Rock River, six miles from the field.

Midwest Refining Company.—This compressor 3-unit plant is located at Elk Basin. It handles

(Continued on Page 18)



High Grade Castings *and* Repair Work

Our complete equipment, and long experience in a wide range of iron and steel work, makes us exceptionally capable in structural work relating to the oil industry.

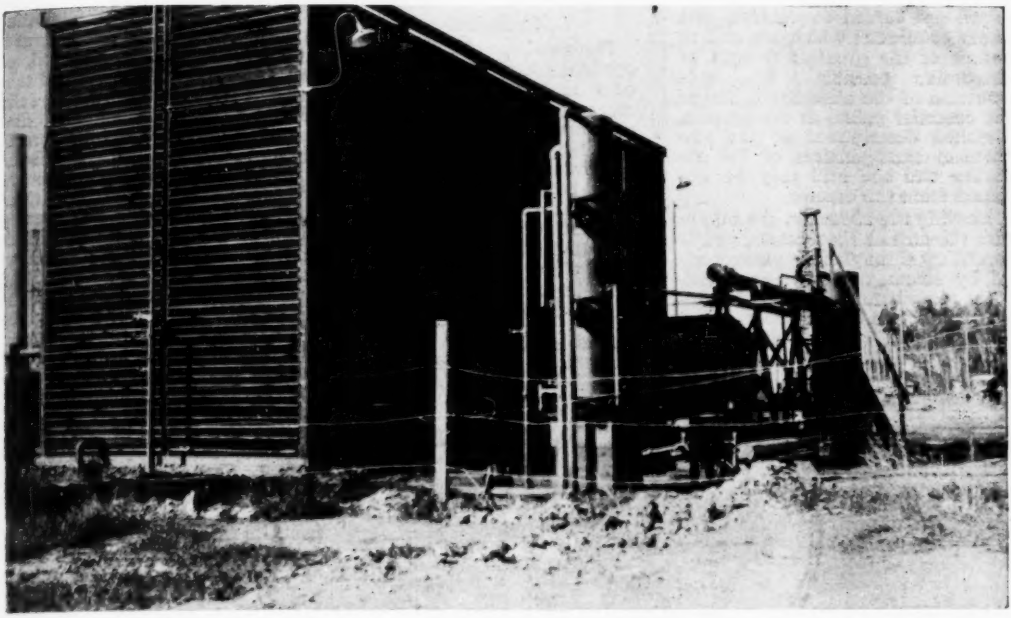
We manufacture large numbers of dome covers, outlet caps and brake shoes—finest material and expert workmanship. Our steel structural work (including smokestacks) for refineries, is put up right and **stays** right.

Gray iron castings supplied in any desired quantity—prompt and efficient repair work of all kinds.

Drop us a line or send a wire—our service is up-to-the-minute.

Western Iron & Foundry Co.

Wichita, Kansas



A "Jitney Unit" gasoline plant erected on a lease in a California field.

"Jitney Unit" Is Latest Gasoline Plant

California engineers now operating new type, one-well absorption assembly

Los Angeles, Calif.—What is claimed to be the latest innovation in the way of gasoline extraction plants is the so-called "Jitney" unit being built by a group of independent engineers in the southern California fields. The Jitney plant is designed as a one-well absorption assembly, and with several of them already in operation, it is maintained that they are efficient and economical, and practically automatic in operation.

The photograph herewith shows one of the small plants connected up on a lease at Santa Fe Springs. All the physical equipment in use is shown in the picture. The steam used in this instance is supplied by boilers from a drilling well nearby.

The economy of using small individual units such as this, it is said will come from the fact that such units can be provided for every well, if necessary. Especially is this desirable when operating in a field which is cut up into small drilling plots, with one well or two wells belonging to one operator, while another operator owns the adjoining properties. A small extraction unit like this can be assembled on an area the size of an average tool shed, and can take care of the gas output of one well or two wells, provided the gas flow is of normal volume.

This equipment may also be found practical where there is small gas production from wells making oil as their principal product, but where it is desired to utilize what gas there is, and strip it for the available condensate it may contain. It may be found also to be of practical adaptability in reducing still vapors, at small refining plants. In fact it is claimed that the low cost and high efficiency of this equipment will make it popular wherever it is desired to strip the natural gas, when such gas is not of sufficient stability to warrant the putting in of a high priced plant, nor of sufficient volume to justify a plant built for greater production at a permanent site.

Patent has been applied for, and it is said that a shop has been established for assembling and marketing the metal parts of the plant. Built in units, it is possible to vary the capacity of the plant, within reasonable limits, and when the equipment is once set up, those who have seen it in operation maintain that it is practically automatic.

Cost $5000

The total cost of the plant shown here is said to be about $5000. Except for the condenser, the equipment is portable. In fact, the condenser could be moved from lease to lease, owing to its lightness of weight, but it is believed that the construction of a condenser would make it impractical to move about, as it would be difficult to build it so that it would hold together with moving. Otherwise the whole plant could be made readily portable.

The equipment consists of the absorber, the still, pump, connections, condenser and heat exchanger. The absorber and the still, shown in the photograph, hold the key to the process and are the results of the experimental work of the owners.

The absorber, in the immediate foreground, is divided into three compartments, horizontally, thru

each of which the gas and absorber oil are forced in contact, and under conditions which are said to permit of the greatest amount of absorption possible. The construction of the absorber is one of the essential points in the process. Detailed descriptions of the mechanical arrangements of the absorber and the still may be obtained from the owners.

Leaving the absorber, the oil enters the still at the bottom, and is forced up through tubes surrounded by steam, and kept at a uniform temperature. The still is divided into two compartments, vertically. The oil is heated as it goes up the tubes on one side, by the steam surrounding the tubes. Then it flows across at the top, and enters similar tubes on the other side of the still, flowing down by gravity. At this point it may be remembered that oil, or any liquid, entering a vertical tube will not flow downward in a solid volume, but will actually flow down the sides of the tube, spreading out a thin film. In this instance, steam is injected under low pressure at the lower end of these tubes, rising through the opening left in the center, and being in direct contact with the oil flowing down the sides of the tubes. The steam lifts off the vapors from the oil, and they are carried out at the top of the still to the condenser. The absorber oil flowing down, goes into the heat exchanger, is cooled, and then follows its course through the absorber again.

Only one pump is used in the whole operation. This circulates the oil. Steam is supplied by boilers from a drilling well. The gas enters the absorbers and circulates from its own pressure.

Engineers have taken considerable interest in the new "Jitney Plant," asd are watching its performance. Several of the plants are already in operation, and said to be giving unusual results. The whole idea is said to be in keeping with Henry Ford's principle of "small units of high efficiency."

Optimism

The new year affords many opportunities to the man who is optimistic, who is energetic, but who uses common sense.

Remember the story about the circus dog?

He buried a nice, fat, juicy bone at a certain place under the main prop in Kansas City and then scratched his front claws off trying to dig it up in Omaha.

An Extraordinary Service to Shippers

Shippers—especially shippers of liquid products—will find it distinctly to their interest to become fully acquainted with the attractive services offered by this company.

Three completely equipped repair shops (at Coffeyville, Tulsa and Chicago) are ready at all times to place your cars in top-notch condition—whether the job calls for merely re-lettering or for complete overhauling.

At Blue Island, Ill., (in the Chicago switching district) we offer extensive facilities for the storage of loaded cars. You are invited to take advantage of these facilities. Full details gladly given on request.

North American Car Co.

327 S. LaSalle St., Chicago

Coffeyville, Kansas **1003 Daniel Bldg., Tulsa Okla.**

Natural Gasoline Industry Shows Large Increase in Rocky Mts.

(Continued from Page 16)

about 10,000,000 cubic feet of gas daily. The gasoline is transported through a 2-inch line to the Burlington railroad line at Frannie.

The Ohio Oil Company.—The plant is located in the central portion of the Lance Creek oil field. The construction was begun in 1918, but the plant has never been finished because the big gasser gave out. Foundations have been placed and a part of the machinery moved to the ground.

Lovell Gas & Electric Company—It is located in Lovell. Erected in 1920 it has a 20-ton ammonia compressor. Ammonia compression process is employed for freezing the gasoline out of the gas that goes through the line to Lovell. Electric drive is supplied by the transmission line from the Lovell Electric plant. The output is about 1000 gallons each day.

Hope Gas Company.—This plant is located at Cowley. It was built in 1919. The seal oil process is used. The oil absorbs the gas which is then distilled for the gasoline. The oil is used many times in the process. The gas averages about three-tenths of a gallon for every 1000 cubic feet.

? QUESTIONS ANSWERED ?

H. B. A., Oklahoma City. What distillation test is required for motor gasoline by the government?

General Statement

A. This specification covers the grade of gasoline used by the United States government and its agencies as a fuel for automobiles, motor boat and similar engines.

The gasoline shall be white in color and free from undissolved water and suspended matter.

Properties and Tests

Distillation range—The temperature limits are as follows: When the first drop has been recovered in the graduated receiver, the thermometer shall not read more than 60° C. (140° F.). When 20 per cent has been recovered in the receiver the thermometer shall not read more than 105° C. (221°F.). When 50 per cent has been recovered in the receiver the thermometer shall not read more than 140° C. (284° F.). When 90 per cent has been recovered in the receiver the thermometer shall not read more than 190° C. (374° F.). The end point shall not be higher than 225° C. (437° F.).

At least 95 per cent shall be recovered as distillate in the receiver from the distillation.

All tests shall be made according to the methods for testing gasoline adopted by the Committee on Standardization of Petroleum Specifications."

C. H. B., Brownsville, Texas. Will you tell me why gasoline which has been distilled from crude oil up to a temperature of 450° F., wil have an end point which is considerably higher than this figure?

A. Crude oil consists of a large number of hydrocarbons, having varying boiling points. As the temperature of the distillation increases, not only does the hydrocarbon boiling at a given temperature distill over, but it also carries with it, by virtue of partial pressures a certain amount of the higher boiling constituents. At 450°F., therefore, certain quantities of heavier hydrocarbons are distilled over with those which normally boil at that temperature. The ratio of heavy to light hydrocarbons in the distillate is less than in the crude oil originally distilled. Consequently the ratio of partial pressures is less, and more of the lighter constituents will distill in proportion to the heavier fractions. In other words, the true boiling points of the heavy molecules will more nearly be reached in the second than in the first distillation, hence, the end point will be higher.

If now a fractionating column be attached to the still in the crude distillation the vapors passing through the column will be subjected to separation. The heavier hydrocarbons will condense, by virtue of their higher boiling points, and be returned to the still. The distillate in this case will contain lower percentages of the heavier fractions and the end point will be lowered. The more efficient the fractionating column the more nearly the end point of the distillate will approach the temperature at which the original distillation was discontinued.

If the second distillation is stopped at 450° F., it will be found that the end point of the distillate from this more nearly approaches 450° F., than that from the first distillation, because the separation is more nearly perfect.

The fractionating column simply increases the number of times the reflux is distilled, all of which takes place in one process.

A. B. H., Fort Worth, Texas. What is the Acid Heat Test? I heard that if unsaturated hydrocarbons are present, the results differs considerably from results obtained by straight run gasoline.

A. The Acid Heat test is used by many laboratories and description is given in Bureau of Mines Bulletin is as follows:

"Apparatus"

"One 1-pint glass bottle provided with a ground glass stopper; one 50-c.c. graduate; one thermometer graduated in 1° divisions. The thermometer used in taking the pour test of lubricating oils is perfectly satisfactory.

Method of Testing

"Pour 150 c.c. of the gasoline into the pint bottle. Pour 30 c.c. of 66° commercial sulphuric acid, containing approximately 93.19 per cent H_2SO_4 into the graduate. Bring both solutions to the room temperature and note the temperature.

"Pour the acid into the bottle containing the gasoline, insert ground glass stopper and shake vigorously for two minutes. Avoid warming the bottle from the heat of the hands. Allow to stand for one minute, then remove stopper, insert the thermometer and note the temperature of the gasoline. The difference between the two readings represents the raise in degrees."

When unsaturated hydrocarbons are present the increase in temperature will be greater and this increase will be proportional to the quantity of the Olefines contained in the sample under examination.

Electrically Driven Centrifuges
Hand Centrifuges
WRITE
WILLIAMS, BROWN & EARLE, Inc.
Manufacturers of Laboratory Apparatus
918 Chestnut St. Philadelphia, Pa.

F. N. WILLIAMS
Petroleum Engineer
Construction, Design, Operation.
Refining troubles corrected.
Refinery management
Expert Refinery personnel supplied
607 Goggan Bldg. Houston, Texas

Oil Conservation Engineering Co.
Petroleum Engineers
Fire Prevention Engineers
Cleveland, Ohio
Texas Office
607 Goggan Bldg:.
Houston, Texas

Refining Activities in the Mountain States

Rocky Mountain section has twenty-eight plants but several are not now running

Casper, Wyo., Jan. 15.—At the start of the new year (1923) there were 28 refineries in operation in the Rocky Mountain region, although there were several standing idle. Those being operated, however, were being run at approximately maximum capacity at the close of the year and during nearly every month of 1922. The Texas Company entered the refining game in the region when it erected its plant east of Casper, thereby supplanting the plans laid out by the Wyoming Refining Company, which had planned to build, near Casper.

Great Falls saw the start of its first refinery during the year, as a result of finding good production in the Kevin-Sunburst region of northern Montana.

Starting with 1922, the Standard Oil Company of Indiana took over the control and operation of all three Midwest plants in Wyoming, thereby combining the six plants of the two companies into one. Had this not been done, there would have been 31 refineries in the Rocky Mountain district. The two refineries at Casper, Greybull and Laramie are now known as one, and as the Standard plant in each instance.

Following is a compiled list of the most important refineries of the district:

Wyoming

Standard Oil Company of Indiana—This refinery is located on the western edge of the city of Casper and on both sides of the North Platte river. It was in 1922 that the Standard, in addition to its own plant, took over the giant plant of Midwest Refining Company immediately adjoining it on the west. The Midwest refinery was made the No. 3 plant, while the two units of the Standard are now known as the Nos. 1 and 2 plants.

Construction work on the Midwest plant was started in 1914. In 1915, this company took over the plant of the Franco-Wyoming Petroleum Company. This was a small plant of four 750-barrel stills and was located east of Casper. The Midwest moved the refinery to its location on the western outskirts of Casper.

In 1919, a wax plant, capable of handling 1500 barrels of wax distillate daily, was added.

During 1922, the Casper refinery averaged 1,350,000 barrels of crude run each month or about 45,000 barrels daily. The plant turned out 30,000 barrels of lubricating oils monthly and 2,500,000 pounds of paraffin wax. In addition plant No. 1 manufactured 5,000 tons of coke each month. Asphalt was made for the first time at the Standard plant, it being manufactured for several paving jobs in the Rocky Mountain region.

With a total of 615,000 barrels of gasoline manufactured on an average each month, the Casper refinery made more gasoline during the last year than any plant in the world. In addition to these products, the local plant also manufactured fuel oil, gas oil, engine distillate, and similar by-products.

During the last year, the addition of steam stills further facilitated the manufacture of gasoline. This improvement work, started a year previous, cost more than $200,000, it is estimated. The tank storage program which contemplates the addition of 110 to 114 more 80,000 barrel tanks will bring the capacity of the tank farm adjoining the refinery to near 11,000,000 barrels.

Gasoline, fuel oil and coke ore made at the No. 1 plant, intermediate processes are handled, but no products actually completed, at No. 2 plant, while the No. 3 plant refines lubricating oils, paraffines, gasoline, and asphalt.

This plant ran 50,000 barrels of crude daily during much of November which exceeds the Whiting, Indiana, plant of the Standard, the largest in the world.

Standard Oil Company of Indiana—In 1914 the Midwest Refining Company built a refinery of 10,000 barrels charging capacity at Greybull on the Big Horn river, which adjoined the Standard plant of 2,000 barrels capacity. On the Burlington railroad connected with the Midwest works is a 78-car capacity loading rack, an absorption gasoline plant, an acid plant, and six cooking stills. Operation is on Cat Creek and largely northern Wyoming crude petroleums. In 1922 the Midwest was taken over by the Standard and both plants operated by this company.

Standard Oil Company of Indiana— In 1919, the Midwest Refining Company, located a plant of nearly 10,000 barrels charging capacity on the Big Laramie river on the Union Pacific railroad, near Laramie. Immediately joining this plant, is the Standard plant of 5,000 barrels capacity. Operation is on Lost Soldier, Ferris, and Rock Creek crudes. The Standard combined the plants under its management as at Casper and Greybull at the start of 1922.

Standard Oil Company of Indiana—This company's plant, adjoining the refinery of the Mutual Refining Company, at Glenrock has a capacity of 2,500 barrels and recracks distillates from the Mutual plant. The refinery was completed early in 1922.

General Petroleum Corporation.—Located near Lovell on a tributary of the Big Horn river and on the Burlington railroad. Erected in 1919. A topping plant, it operates on Cat Creek, Elk Basin, and Byron crudes. Charging capacity 500 barrels.

Alliance Oil & Refining Company.—On Big Horn river near Thermopolis and on the Burlington railroad. Built in 1918. It's a topping plant. Warm Springs crude used largely, being connected by 3-inch pipe, line being 15 miles long. Capacity nearly 1,500 barrels.

Mutual Oil Company, Situated near Glenrock, 25 miles east of Casper. Located on North Platte river, Burlington and Northwestern railroad lines. It was constructed in 1919. Skimming plant. Big Muddy and Salt Creek crudes are run. Present charging capacity about 10,000 barrels.

Mutual Oil Company.—At Cowley on Burlington line. Built in 1918, uses Byron and Elk Basin crudes. Skimming plant. Capacity about 750 barrels.

McWhorter-Osage Refining Company—At Lusk on Northwestern railroad and on Niobrara river, constructed in 1918 during boom period of Lance Creek field, has never been placed in operation. Charging capacity 250 barrels.

Producers & Refiners Corporation.—Now building a 10,000-barrel refinery near Grenville, Wyo., southern Wyoming. Initial capacity may be only 5,000 barrels. Skimming plant. Crude requirements to come from the Ferris and Lost Soldier fields at first. Pipe line to Salt Creek may be laid later as increase in crude demands come.

McWhorter Oil & Refining Company. — Situated near Osage on the Burlington railroad line.

(Continued on Page 29)

RECENT REFINERY PATENTS ISSUED

BY STAFF REPRESENTATIVE

Washington, D. C.—The following patents of interest to the oil-refining industry have been recently issued by the United States Patent Office:

Blaisdell Process

No. 1,437,712, issued on December 5, 1922, to Elmer C. Blaisdell, Glenrock, Wyoming, for a cracking apparatus, consisting of a horizontally disposed evaporating tank, a main condensing tank in communication with the evaporating tank and disposed there above, a relatively small condensing tank associated with the first mentioned condensing tank, a pipe for providing communication between the condensing tanks at the upper ends thereof, a pipe providing communnication between the first mentioned pipe and the relatively small tank, a pipe for receiving fluid from the relatively small tank, valve members in the pipes for controlling the pressure of the vapor therein, and a return pipe providing communication between the relatively small tank and evaporating tank.

Separating Constituent Hydrocarbons

No. 1,437,689, a process for separating constituent hydrocarbons of petroleum vapors by partial condensation thereof, issued on December 5 to Henry C. Smart, assignor to Standard Oil Company of New York, New York, N. Y. The process consists in separating constituent hydrocarbons of petroleum vapors from each other, by a procedure wherein petroleum vapors evolved at temperatures above 600 degrees F. have the form of a thin annular stream, divided into successive sections of greater length than thickness of stream while flowing over and in contact with the surface of an air-cooled heat-conducting wall, the improvement which consists in abstracting heat from said thin stream of vapors by means of a confined and controlled stream of cooling air greater in thickness than the vapor stream and equal in length to the combined lengths of a succession of said vapor stream sections, the said air stream flowing over and in contact with the opposite surface of said heat-conducting wall and becoming warmer as it passes the successive sections, and in causing the so formed condensate to separate from the vapors between sections and to flow away without descending through lower sections of said vapor streams, substantially as described.

Treating Oil

No. 1,438,764, a method of treating oil, issued on December 12 to Ernst M. Johansen, assignor to The Atlantic Refining Company, Philadelphia, Pa., a corporation of Pennsylvania. The patent comprises the method of treating mineral oil, as petroleum or petroleum product, which consists in washing the same with soap solution, separating the washed oil from the accompanying aqueous solution, acid-treating the separated oil, separating the resultant sludge and oil from each other, and thereafter neutralizing said last-named oil with an aqueous solution of alkali.

The method of treating crude petroleum, which consists in topping the same, and washing the resulting reduced crude oil with aqueous soap solution.

The method of treating mineral oil, as petroleum or petroleum product, which consists in washing the same with soap solution, and thereafter acid-treating the washed oil.

Treating Oil

No. 1,439,171, a method of treating oil, issued to Charles F. Kennedy, assignor to The Atlantic Refining Company, Philadelphia, a corporation of Pennsylvania. The patent is a method of preparing wax bearing oil for separating wax therefrom, which comprises washing the oil with a soap solution of such concentration as to prevent substantial emulsification thereof and to render the wax more readily separable from the oil.

Manufacture of Gasoline

No. 1,439,683, issued on December 26 to Raymond F. Bacon and Benjamin T. Brooks, assignors to Gulf Refining Company, Pittsburgh, a corporation of Texas. The patent, covering the manufacture of gasoline, comprises a method of producing from petroleum oils a product intended particularly for use as fuel for internal combustion engines, which consists in subjecting a heavy distillate of mixed base petroleum, which heavy distillate has a specific gravity of above 0.860 and is substantially free from the lower boiling solar oil having a specific gravity of 0.860 and below, and is also substantially free from heavy base constituents of the petroleum to a combined cracking and distilling operation, at a pressure within the range of 60 pounds to 300 pounds per square inch and a a temperature within the range of 300 C. degrees to 500 C. degrees.

Recovering Gasoline

No. 1,439,921, a method of recovering gasoline from natural gas, issued on December 26 to Eric A. Starke, Berkely, California, comprising an apparatus for the described purpose comprising, in a closed circuit, a certifugal pump; means for introducing absorbing oil together with a hydrocarbon gas, to the suction side of said pump; a plurality of elongated, recumbent vessels communicating successively at intervals from the top cross sectional area of one to the bottom cross sectional area of the next; a pipe leading from the discharge side of the centrifugal pump, to the bottom cross sectional area of the first of said vessels; means for discharging the non-absorbed residue gas from the top cross sectional area of the last of said vessels; a still; means for conveying the enriched oil from the bottom cross sectional areas of all of said vessels to the still; and means for returning the improverished oil from the still to the absorbing oil introducing means connected with the suction side of the pump.

Gas and Oil Separator

No. 1,440,197, issued on December 26 to Herbert Wirshing, Tulsa, Okla., comprising a gas and oil separator of the character described comprising a vertical cylinder having closure at the ends, an oil inlet at the bottom thereof, an oil outlet also at the bottom thereof, a gas outlet in the top of the cylinder, a combined oil and gas pipe leading from a source of supply and connected with said inlet, a branch pipe leading upwardly threfrom and having an inlet nozzle projecting into said cylinder at a point substantially below the top thereof and substantially above the maximum level of oil therein, a gas chamber being provided above the level of the oil and the top of said cylinder, a valve interposed between said branch pipe and said inlet for permitting the flow of oil directly into the bottom of said

cylinder or through said branch pipe, at will, and a back pressure valve connected with said oil outlet for maintaining a substantially uniform volume of oil and pressure of gas in said cylinder, for the purpose described.

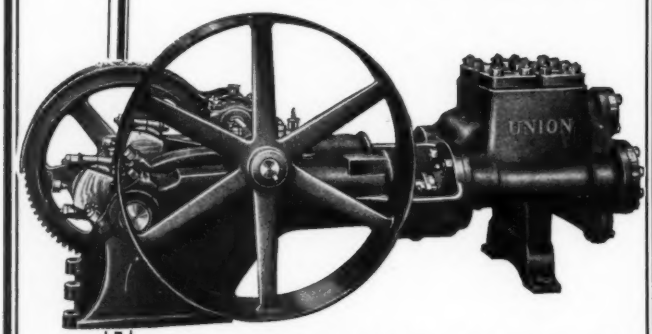
Treating Hydrocarbons

No. 1,440,286, a treatment of hydrocarbons, issued on December 26 to George Frederick Forwood, London, England, assignor, by direct and mesne assignments to The United Kingdom Oil Company, Limited, London. The herein described process of hydrogenerating oils, consisting in subjecting the oil to pressure to atomize it and instantly mixing the atomized oil with steam, passing the mixed atomized oil and steam solely through a mass of carcoal heated to a temperature below 600 C. degrees to decompose the steam and with the resultant hydrogen in its nascent or atomic condition at the moment of its liberation from the steam affecting a combination with the unsaturated bodies in the cracked oil and converting them into saturated bodies.

Treating Oil

No. 1,440,352, issued on December 26 to Orlando C. Gatrell, El Dorado, Kansas, on a method of treating oil containing water. The patent comprises the method herein described for dehydrating oil in storage tanks, consisting in heating a quantity of oil, agitating the oil and introducing thereinto Portland cement and slaked lime, in powdered form.

Union Oil Line Pumps
For Power



GOOD FOR 500 TO 1000 POUNDS PRESSURE

Every refinery engineer knows Burnham Simplex Pumps. Union Duplex Pumps—steam or power—are in the same class.

A pump made for every need in the oil industry. Write requirements.

Union Steam Pump Co., Battle Creek, Mich.

UNION PUMPS

El Paso Compounding Plant Ready to Start

El Paso, Texas.—The Savage Petroleum Company has been organized here by A. J. McBee and V. H. Anderson, to engage in blending, compounding and jobbing lubricating oils and greases.

A plant is being equipped at 1822 Magoffin avenue, adjacent to the El Paso and South Western railroad line, where warehouse room, tankage, offices and laboratories of the company will be located. The new building is already completed, and tanks are being set, preparatory to getting into production by January 1st.

The new company plans to deal exclusively in oils and greases, marketing it's own trade-name products under the "Savage" brand, in West Texas, New Mexico, Arizona and Northern Mexico.

The Next Morning

This pome, author unknown, is taken from the pre-Volstead era, but the fellow who draws the pictures of Paul Peebles' experiences can get this way with corn:

I dreamed that I dwelt on an isle of cracked ice,
In the midst of a lake of champagne,
Where bloomed the mint julep in meadows of green,
Amid showers of lithia rain.

I reclined on a divan of lager beer foam,
With a pillow of froth for my head,
While the spray from a fountain of sparkling gin fizz
Descended like dew on my bed.
From far-away mountains of crystalline ice
A zephyr refreshing and cool,
Came wafting the incense of sweet muscatel
That sparkled in many a pool.
My senses were soothed by the soft purling song
Of a brooklet of pousse cafe,
That rippled along over pebbles of snow
To a river of absinthe frappe.
Then, lulled by the music of tikling glass
From the schooners that danced on the deep
I dreamily sipped a highball or two
And languidly floated to sleep.
And then I awoke on a bed full of rocks,
With a bolster as hard as a brick;
A wrench in my neck, a rack in my head,
And a stomach detestably sick;
With sand in my eyes and grit in my throat,
Where the taste of last evening still clung,
And felt a bath towel stuffed into my mouth
Which I afterward found was my tongue;
And I groped for the thread of the evening before,
In a mystified maze of my brain,
Until a great light burst on me at last,
I'm off the wagon again!

Kansas-Oklahoma-Texas Refinery Operations

OKLAHOMA

Company and Address—	Plant Location	Capacity in Barrels	Running First of Year
Acme Ref. & P. Line Co., Jennings, Okla.	Jennings	3,000	*
Allied Ref. Co., Tulsa	Okmulgee	1,500	1,000
Assoc. P. & R. Co., St. Louis, Mo.	Yale	1,000	*
Atwood Ref. Co., Okla. City	Okla. City	1,000	1,000
Barnsdall Ref. Co., Tulsa	Barnsdall	3,000	2,400
Bay State Ref. Co., Tulsa	Healdton	1,000	*
Beaver Pet. Ref. Co., Dilworth	Dilworth	700	*
Big Six Ref. Co., Sapulpa	Sapulpa	3,000	*
Bison Ref. Co., Stillwater	Quay	1,000	*
Blue Ribbon O & R Co., Walters	Walters	500	*
Bolene Ref. Co., Enid	Enid	4,000	3,000
Buffalo Ref. Co., Yale	Yale	1,600	*
Cameron Ref. Co., Ardmore	Ardmore	3,500	3,400
Canfield Ref. Co., Yale	Yale	500	200
Carter Oil Co., Tulsa	Cartoco	8,000	1,000
Champlin Ref. Co., Enid	Enid	16,000	9,000
Cherokee Ref. Co., Oilton	Oilton	1,000	*
Chestnut & Smith Corp., Tulsa	Sand Springs	5,000	*
Chickasaw Ref. Co., Ardmore	Ardmore	2,500	1,000
Coleman-Nelson Corp., Tulsa	West Tulsa	1,500	*
Constatin Ref. Co., Tulsa	West Tulsa	5,000	1,800
Constantin Ref. Co.	Devol	10,000	1,800
Cosden & Co., Tulsa	West Tulsa	35,000	30,000
Cushing Ref. Co., Cushing	Cushing	2,000	1,600
Cyril Ref. Co., Okla. City	Cyril	500	400
Daisy Belle Pet. Co., Ardmore	Wilson	2,000	100
Damascus Ref. Co., Lawton	Lawton	2,400	*
Duncan Ref. Co., Duncan	Duncan	1,000	*
El Dorado Ref. Co., Ft. Worth	Yale	700	*
Empire Refs., Inc., Tulsa	Cushing	4,500	3,200
Empire Refs. Inc., Tulsa	Okla. City	2,000	*
Empire Refs., Inc., Tulsa	Okmulgee	3,500	2,600
Empire Refs., Inc., Tulsa	Ponca City	5,000	3,000
Equality Ref. Co., Oilton	Oilton	1,000	*
Equitable Ref. Co., Tulsa	Allen	1,200	100
Fairmount Ref. Co., Fairmount	Fairmount	1,500	800
Francis Oil & Ref. Co., Okla. City	Francis	1,000	*
Frederick O & R Co., Frederick	Frederick	800	*
Garber Ref. Co., Garber	Garber	1,500	900
Globe O & R Co., Blackwell	Blackwell	3,000	3,000
Golden Belt Ref. Co., Okla. City	Okla. City	200	*
Grandfield O & R Co., Grandfield	Grandfield	2,800	*
Great American Ref. Co., Tulsa	Jennings	1,500	*
Harbor O & R Co., Henryetta	Henryetta	1,000	§
Home Oil Ref. Co., Ft. Worth	Yale	2,500	*
Home Pet. Co., Okla. City	Okla. City	2,500	*
Illinois Oil Co., Rock Island, Ill., branch at Tulsa	Cushing	2,000	1,400
Illinois Ref. Co., Tulsa	Bristow	2,500	*
Imperial Ref. Co., Tulsa	Ardmore	3,500	3,200
Indiahoma Ref. Co., St. Louis, Mo.	Okmulgee	8,000	5,000
Indian Chief Ref. Co., Cushing	Cushing	1,800	*
Inland Ref. Co., Tulsa	Cushing	3,000	1,800
Johnson O & R Co., Chicago, Ill.	Cleveland	2,000	2,000
Lawton Ref. Co., Lawton	Lawton	1,200	*
Livingston Ref. Corp., Tulsa	Walters	3,000	*
Marland Ref. Co., Ponca City	Ponca City	12,000	10,000
Meridian Pet. Corp., Kan. City, Mo.	Ponca City	2,000	*
Meridian Pet. Corp., Kan. City, Mo.	Hominy	1,000	*
Meridian Pet. Corp., Kan. City, Mo.	Okmulgee	3,000	*
Mid-co Gasoline Co., Tulsa	West Tulsa	7,000	*
Mid-Continent Ref. Co., Ringling	Ringling	800	*
Modern Ref. Co., Blackwell	Blackwell	1,000	500
Noco Pet. Co., Okla. City	Okla. City	2,000	*
N. American Oil Co., Okla. City	Okla. City	3,500	*
Nyanza Ref. Co., Ardmore	New Wilson	2,000	800
Oil State Ref. Co., Enid	Enid	2,500	1,100
Oil State Ref. Co., Enid	Allen	1,500	300
Oklamade Ref. Co., Tulsa	Chelsea	1,000	*
Okla. P & G Co., Tulsa	Devol	3,000	*
Okla. P. & R. Corp., Tulsa	Muskogee	2,000	1,200
Osage Mutual O & R Co., Pawhuska	Pawhuska	500	*
Peppers Gasoline Co., Enid	Covington	2,000	800
Phillips Higrade Ref. Co., Tulsa	Okmulgee	3,000	2,000
Pierce Oil Corp., N. Y., N. Y., Ft. Worth, Texas	Sand Springs	10,000	5,000
Polar P & R Co., Tulsa	Sapulpa	1,500	*
Pontotoc P. Line & R. Co., Allen	Allen	1,000	¶
Process Ref. Co., Newkirk	Newkirk	1,000	*
Prod. & Ref. Corp., Tulsa	West Tulsa	5,000	5,000
Prod. & Ref. Corp., Tulsa	Blackwell	2,000	1,800
Pure Oil Co., Tulsa	Ardmore	7,000	3,100
Pure Oil Co., Tulsa	Cushing	6,000	2,500
Riverside Ref. Co., Oilton	Oilton	1,500	*
Rock Island Pet. Co., Guthrie	Guthrie	1,000	*
Rock Island R. & P. L. Co., Duncan	Duncan	1,000	*
Sagamore Oil Corp., Grandfield	Grandfield	2,000	1,800
Sapulpa Ref. Co., Tulsa	Sapulpa	6,000	6,000
Shaffer O. & R. Co., Chicago, Ill.	Cushing	6,000	4,500
Sinclair Ref. Co., Kan. City, Mo.	Cushing	6,000	6,000
Sinclair Ref. Co., Kan. City, Mo.	Muskogee	2,000	1,000
Sinclair Ref. Co., Kan. City, Mo.	Vinita	10,000	*
Southern Oil Corp., Tulsa	Walters	1,800	*
Southern Oil Corp., Tulsa	Yale	5,000	*
Southern Ref. Co., Haskell	Haskell	1,000	*
Southern Oil Corp., Okla. City	Enid	1,800	*
Sun Oil Co., Tulsa	Yale	3,000	2,000
Texas Co., Tulsa	West Tulsa	8,500	7,000
Tidal Ref. Co., Tulsa	Drumright	4,500	3,000
Transcontinental Oil Co., Tulsa	Boynton	2,500	2,400
Transcontinental Oil Co., Tulsa	Bristow	5,000	4,000
Travis-Senter Ref. Co., Comanche	Comanche	1,500	500
Uncle Sam Oil Co., leased to Tidal Gasoline Co	West Tulsa	1,500	*
Union O & R Co., Grandfield	Grandfield	2,500	*
Wagoner Ref. Co., Wagoner	Wagoner	500	*
Wilcox, H. F., O & G Co., Tulsa	Bristow	500	*
Yale Oil Corp., Yale	Yale	1,600	400

KANSAS REFINERIES

Company and Address—	Plant Location	Capacity in Barrels	Running First of Year
Asso'd P & R Co., St. Louis, Mo.	El Dorado	1,000	*
Bell P & R Co., El Dorado	El Dorado	700	*
Blue Ridge Ref. Co., Wichita	Wichita	1,000	300
Chem. O & G Co., Osawatomie	Osawatomie	1,000	*
Commonwealth O & R Co., K. C., Mo.	Moran	800	200
Derby Oil Co., Wichita	Wichita	1,500	800
Derby Oil Co., Wihita	Wichita	5,000	4,000
El Dorado Ref. Co., El Dorado	El Dorado	4,000	3,000
Equitable Ref. Co., Tulsa	Augusta	2,500	*
Frontier Ref. Co., Hutchinson	Hutchinson	2,000	1,500
Gen. American Oil Co., Tulsa	Baxter Springs	1,000	*
Golden Rule Ref. Co., Wichita	Wichita	800	400
Great Western O. R. Co., Chicago	Erie	1,500	300
Great Western O R Co., Chicago	Florence	2,000	*
Imperial Ref. Co., Cherryvale	Cherryvale	2,000	*
Kanotex Ref. Co., Arkansas City	Ark. City	3,000	2,000
Kan. City Ref. Co., Kan. City	Kan. City	5,000	4,000
Kan. O R Co., Coffeyville	Coffeyville	2,000	*
Lakeside Ref. Co., Chicago	Augusta	2,000	600
Lesh Ref. Co., Ark. City	Ark. City	1,600	1,200
Midland Ref. Co., El Dorado	El Dorado	5,000	4,500
Miller Pet. Co., Kan. City, Mo.	Humboldt	1,500	1,000
Moore Ref. Co., Arkansas City	Ark. City	4,500	4,000
Mutual Oil Co., Kan. City, Mo.	Chanute	1,500	800
Nat. Ref. Co., Cleveland, O.	Coffeyville	5,000	5,000
Peerless O & R Co., Chanute	El Dorado	2,500	800
Puritan Ref. Co., Rosedale	Rosedale	1,000	*
Red Ball Ref. Co., El Dorado	El Dorado	2,500	*
St. Louis O & R Co., St. Louis, Mo.	El Dorado	1,500	500
Sinclair Ref. Co., Kan. City, Mo.	Coffeyville	6,000	§
Sinclair Ref. Co., Kan. City, Mo.	Kan. City	6,000	5,000
Standard Asphalt & R Co., (Empire Ref. Inc.) Tulsa, Okla.	Independence	500	‡
Standard Oil Co., (Kan) Neodesha.	Neodesha	12,000	5,000
Sterling O & R Co., Wichita	Wichita	5,000	4,800
Vickers Pet. Co., Wichita	Potwin	1,800	1,000
White Eagle O & R Co., Kan. City.	Augusta	6,000	6,000

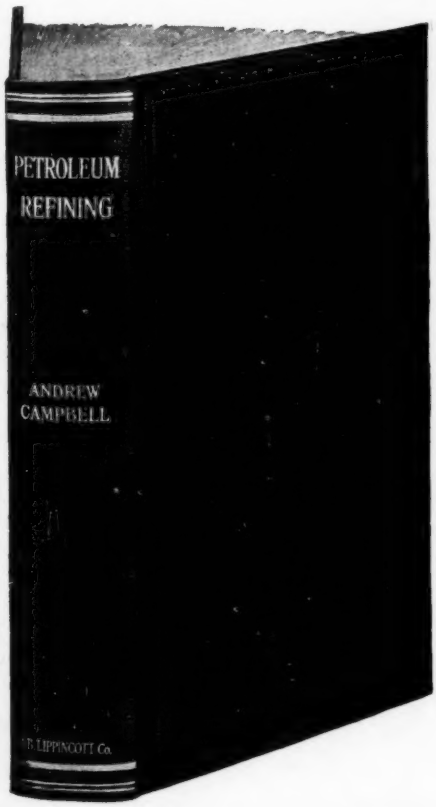
* Shut down. § Rerunning. ‡ Making asphalt.

TEXAS REFINERIES

Company and Address—	Plant Location	Capacity in Barrels	Running First of Year
Abel Ref. Co., Houston	Houston	¶	
~~Reese S. Allen~~ Ref. Co., W. Falls	Amarillo	1,500	*
American Oil Co., Ft. Worth (Ryan Process)	Pioneer	2,000	1,000
American Ref. Co., W. Falls	W. Falls	5,000	2,500
Asso'd Prod. & Ref. Corp., St. Louis, Mo. (was Bankers)	W. Falls	1,000	*
Baney Ref. Co., Brownwood (was Gatebo O. & R. Co.)	Brownwood	500	*
Bankers Prod. & Ref. Co., W. Falls	W. Falls	1,000	*
Beacon Ref. Co., W. Falls (owned by Griswold)	Henrietta	2,500	2,000
Blue Ribbon Oil & Ref. Co., Brownwood	Brownwood	500	*
H. E. Boner, W. Falls	Burkburnett	700	650
Brickman Ref. Co., Mexia	Mexia	500	*
Bridgeport Ref. Co., Bridgeport (Formerly Edmonds)	Bridgeport	700	*
Buffalo Oil & Ref. Co., Sherman	Sherman	400	200
Burk-Tex Ref. & P. L. Co., Burkburnett (now Revere O. Co.)	Burkburnett	4,000	*
Carolina Oil Co., Nacogdoches (now Yuba Oil Co.)	Nacogdoches	150	*
Clayton Oil & Ref. Co., Dallas (was Hercules Pet. Co.)	Dallas	5,000	4,000
Chambers Ref. Co., Corpus Christi	Corpus Christi	500	
Coleman Ref. Co., Coleman	Coleman	¶300	
Consolidated Prod. & Ref. Co. Ft. Worth	Tiffin	5,000	*
Continental Ref. Co., Abilene (was General O. & R. Co)	Abilene	400	200
Crescent Ref. Co., Denton	Denton	250	*
Corsicana Oil & R. Co., Corsicana	Corsicana	500	*
Cross Plains Ref. Co., Cross Plains	Cross Plains	500	*
Crown Oil & Ref. Co., Houston (White Oil Corp).	Houston	3,500	2,500
Crystal Pet. & Ref. Co., Burkburnett	Burkburnett	1,000	500
Dale-Hinton Ref. Co., Houston	Humble	100	50
Abner Davis Ints. Ft. Worth	Ft. Worth	50	*
Deepwater Oil Refs. Houston	Houston	3,000	2,800
DeLeon P. L. & Ref. Co., DeLeon (formerly Rex Ref. Co.)	De Leon	1,500	*
Denison Oil & Ref. Co., Denison	Denison	¶	
Eastland-Pioneer Oil Ref. Co. Cisco (was Liberty)	Cisco	~~2,500~~ 5000	
Edmonds Oil & Ref. Corp., Ft Worth	Ft. Worth	3,500	*
Eggleston Oil & Ref. Co., San Antonio	Somerset	1,200	
Farmers Oil & Ref. Co., Texarkana	Texarkana	2,000	
~~Fay Pet. & Ref. Co.~~, South Bend	South Bend	1,000	150
Fed. Oil & Ref. Co., Ft. Worth	Ft. Worth	3,000	
Four States Ref. Co., Texarkana	Texarkana	750	
Freeport Asphalt Co., Houston	Bryan Mound	8,000	4,000
Galena-Signal Oil Co., Houston	Houston	5,000	3,500
General Oil Co., Houston	Eastland	1,500	*
Gorman Home Ref. Co., (owned by J. McLester)	Gorman	2,000	*
Graham Ref. Co., Graham	Graham	1,200	400
Grayburg Oil Co., San Antonio	San Antonio	2,000	
Great Texas Oil & Ref. Co., Ft. Worth	Breckenridge	¶5,000	
Great Lakes Western Ref. Co., Houston	Pasadena	¶500	
Great Texas Oil & Ref. Co., Ft. Worth	De Leon	¶1,000	
Guarantee Pet. Co., Breck'ridge	Breck'ridge	100	*
Gulf Ref. Co., Houston	Port Arthur	115,000	80,000
Gulf Ref. Co., Houston	Ft. Worth	~~15,000~~ 7,500	8,000
Hagaman Ref. Corp., Ranger (was Ranger R. & P. L.)	Tiffin	1,200	400
~~Haskell Int.~~ W. Falls	Vernon	100	100
Hillman Ref. Co., Sweetwater	Sweetwater	¶	
Home Oil & Ref. Co., Ft. Worth	Ft. Worth	5,000	*
Houston Terminal Ref. Co., (was Port Houston)	Houston,	¶3,700	
Humble Oil & Ref. Co., Houston	Baytown	20,000	20,000
Humble Oil & Ref. Co., Houston	Burkburnett	2,000	1,200
Humble Oil & Ref. Co., Houston	San Antonio	2,000	~~1,500~~
Interstate Gas. Co., W. Falls (was New Era)	Iowa Park	2,500	1,200
Iowa Park P. & R. Co., W. Falls	Iowa Park	~~1,300~~ 500	1,100
Johnson Oil Co., Brownwood	Brownwood	250	200
Elliott Jones & Co., Inc., San Antonio	San Antonio	4,000	~~4,000~~
~~Jones M., Refining Co.~~, Brazos	Brazos	500	*
Keen & Wolf Oil Co., Houston	Houston	1,500	1,500
Keystone-Ranger Ref. Co., W. Falls	W. Falls	2,000	
Keystone Ref. Co., Dublin	Dublin	¶500	
~~Kirk Ref. Co.~~, Laredo	~~Laredo~~		
La Porte O & R Co, Houston	Morgans Point	500	*
Laurel Refs., Inc., San Antonio	San Antonio	225	
Lewis Oil Corp., Dallas (was Bear or Inter Ocean)	Burkburnett	1,000	*
Lone Star Ref. Co., W. Falls	W. Falls	2,500	1,500
Magnolia Pet. Co., Dallas	Beaumont	55,000	35,000
Magnolia Pet. Co., Dallas	Ft. Worth	10,000	6,000
Magnolia Pet. Co., Dallas	Corsicana	2,500	2,500
Manhattan Oil R. Co., W. Falls	Burkburnett	3,500	
Manhattan Pet. Co., W. Falls (was Dixie)	W. Falls	750	600
Metric Ref. Co., South Bend	South Bend	500	100
Mexia Asso'd Synd., Mexia	Angus	¶500	
Mexia Oil & Ref. Co., Mexia	Mexia	1,000	100
Mexia Ref. Co., Mexia	Mexia	¶500	
Miller Pet. Co., Dallas	W. Falls	2,500	2,000
Mirando City Ref. Co., Mirando	Mirando	¶1,000	
Montrose Oil Ref. Co., Ft. Worth	Ft. Worth	5,000	3,000
Morris Oil & Ref. Co., Waco	South Bosque	1,000	*
Nat. Pet. Co., Mexia	Mexia	500	*
Noble O & G Co., Tulsa	Burkburnett	4,000	2,500
Nortex Ref. Co., W. Falls	Burkburnett	1,500	900
N. Texas O. & R. Co., Greenville	Greenville	2,000	
Odessa O. & R. Co., (Clements & Lavery), Ranger	Tiffin	500	40
Oriental Oil Co., Dallas	Dallas	2,400	1,500
Oriental Oil Co., Dallas (was Eastland, Aetna or Trinity)	Dallas	3,500	*
Orient Pet. Co., W. Falls	W. Falls	1,000	600
Owens Ref. Co., Cameron	Minerva	1,500	~~150~~
Owenwood Oil Corp., Ft. Worth (was Invader)	Burkburnett	2,000	*
Panhandle Ref. Co., Dallas	W. Falls	4,500	3,400
Panther City O. & R. Co., (owned by Revere Oil Co.)	Ft. Worth	1,000	*
Pantander Oil & Ref. Co., Ft. Worth	Ft. Worth	5,000	*
Pa-Tex Pet. Co., Mexia	La Porte	300	*
Patterson Oil Co., Brownwood	Brownwood	1,000	500
Pioneer O & R Co., San Antonio	Somerset	1,200	
Pioneer Ref. Co., Pioneer	Pioneer	100	50
Prairie Ref. Co., Dallas	Grand Prairie	300	*
Pet. Corp., W. Falls (was Beaver-Electra	Electra	2,000	1,500
Pierce Oil Corp., Ft. Worth	Ft. Worth	10,000	*
Pierce Oil Corp., Ft. Worth	Texas City	8,000	*
Producers Ref. Co., Ft. Worth (Empire Ref.)	Gainesville	10,000	5,000
Primrose Ref. Co., Dallas (was Abner Davis)	W. Falls	1,200	700
Ranger R & P L Co., Ranger	Ranger	1,500	*
Ranger-Wichita Ref. Co., W. Falls	W. Falls	2,500	*
Rex R. & R. Co., Sweetwater	Sweetwater	~~1,500~~	200
Rio Grande Oil Co., El Paso	El Paso	2,000	2,000
Seaboard O & R Co., Galveston	Orange	350	
Sinclair Ref. Co., Houston	Houston	10,000	10,000
Slimp Ref. Co., San Antonio	Somerset	1,000	
Star R & P Co., Ft. Worth	Ft. Worth	2,800	1,000
State Ref. Co., Dallas	Grand Prairie	1,800	700
Sunshine State O & R Co., W. Falls	W. Falls	2,500	1,200
Superior O & R Co., Comanche (now Lewis Oil Corp.)	Comanche	1,500	*
Taylor Bros. Ref. Co., Rockdale	Tracy	100	100
Texas Oil Products Co., Waxahachie	Waxahachie	1,200	600
Texhoma O & R Co., W. Falls	W. Falls	4,000	3,000
Tex-Oil Ref. Co., Burkburnett	Burkburnett	800	*
The Texas Co., Houston	Port Arthur	45,000	40,000
The Texas Co., Houston	Dallas	15,000	15,000
The Texas Co., Houston	Port Neches	20,000	15,000

¶ Building or increasing capacity to amount named.
* Shut down.

Petroleum Refining



By Andrew Campbell, F. I. C, F. R. S. E., member of the Institute of Petroleum Technologists. Foreword by Sir Boverton Redwood.

The only treatise devoted entirely to the subject of Petroleum Refining. Covers examination of crude oil, general departments, distillation, paraffin extraction and refining, candle manufacture, chemical treatments, distribution of products, engineering specifications.

One Volume, 138 illustrations, including 29 folding plates and 3 diagrams; also 11 tables. Price $8.50.

USE THE COUPON

The Gulf Publishing Company,
Houston, Texas.

Gentlemen:

Enclosed find check for $8.50 for which please send me postpaid one volume of PETROLEUM REFINING, by Andrew Campbell.

Name.....

Street and No. .....

City and State.....

TEXAS REF CO ANDERSON PRICHARD OIL CORP OKLA CITY COLORADO, TEXAS — 1500 BBLS —

REFINERY AND GASOLINE PLANT ACTIVITIES

Pioneer Field Will Get Two Refineries

Fort Worth, Texas.—Construction work on two refining plants in and near the Pioneer field in Eastland County has been completed, and operations will start immediately. The American Oil Company, which has headquarters in the F & M Bank building in Fort Worth, has a 2,000 barrels daily capacity refinery located on the edge of the town of Pioneer. This plant is equipped with the T. J. Ryan patented process of refining crude oil, and its entire output of refined products will be marketed by the Radio Petroleum Company of Fort Worth. The officers of the American Oil Company are: T. J. Ryan of Tulsa, president; J. B. Nabors, vice president; C. D. Nabors, secretary and treasurer. J. H. Casey is actively in charge of the operation of the plant. The American Oil Company has made a contract for its crude supply with the Western Oil Sales Corporation, which has a large quantity of crude production in the field tied up over a long period for a 25 cents premium above the posted price.

The other plant is located several miles west of the field at Cross Plains in Callahan County. It was built by the Cross Plains Refining Company, and has a daily capacity of 500 barrels. E. G. Witter is general manager of the Company, and J. D. Ford, formerly of Wichita Falls, has been made plant superintendent.

New Refinery Starts on High Grade Pioneer Oil

Fort Worth, Texas.—The 1500 barrel refinery of the American Oil Company at Pioneer has just been completed and will begin operations. The new plant will operate on the high gravity Pioneer crude. Output of the plant will be handled by the Radio Petroleum Company.

Bunger Gasoline Plant Sold to Hurley-Texas

Wichita Falls, Texas, Jan. 3.—The Hurley-Texas Gasoline Company, which is a subsidiary of the Hurley Gasoline Company of Los Angeles and Tulsa, has purchased the Fred B. Foster and Company's 10,000,000 cubic foot absorption plant in the Bunger district of Young County for a consideration of $67,500, with part cash and the balance in notes. This plant was completed several months ago, and is now manufacturing about 3500 gallons of gasoline daily. The Hurley Company owns seven plants in California and five in Texas and Oklahoma.

California Interest to Build Sour Lake Plant

Sour Lake, Texas.—A lubricating plant with an initial capacity of 1250 barrels, which will operate on Gulf Coast crude, will be constructed just south of Sour Lake by C. J. Laughren of Los Angeles. A circulating process similar to that used successfully in California will be used.

F. R. McArthur is chief engineer and T. D. Boyce is the consulting engineer.

The Rio Bravo Oil Company has contracted to deliver to the refinery 500 barrels of Saratoga crude per day. The remaining crude will be bought out on the open market.

OUTPUT OF REFINERIES IN UNITED STATES FOR OCTOBER, 1922

1922	East Coast (N.Y.,Phila. & Balt.)	Pa., N. Y., East Ohio & W. Va.	W. Ohio, Ind., Ill., Ky. & Tenn.	Oklahoma & Kansas	Texas
Crude Run bbl.)	8,434,932	1,921,258	4,416,994	6,969,573	7,962,672
Oils purch. and re-run (bbl.).	1,291,921	99,488	391,143	476,418	660,275
Gasoline (gal.)	104,802,103	26,189,874	84,000,010	113,585,998	86,838,918
Kerosene (gal.)	50,776,370	12,017,350	19,695,234	32,355,919	50,958,274
Gas and Fuel (gal.)	167,986,786	19,660,371	66,237,550	132,156,757	171,446,711
Lubricating (gal.)	28,653,066	14,204,329	7,086,361	6,694,434	19,979,947
Wax (lb.	13,353,100	6,969,730	3,815,193	2,491,070	3,232,394
Coke (ton)	14,650	1,294	19,169	1,969	7,462
Asphalt (ton)	102,058	775	10,280	.....	30,764
Miscellaneous (gal.)	10,135,940	6,215,720	9,620,761	16,054,542	9,007,212
Losses (bbl.)	409,843	118,986	170,665	260,669	356,099

1922	Louisiana and Arkansas	Colorado & Wyoming	California	TOTAL	DAILY AVERAGE 1922	DAILY AVERAGE 1921
Crude Run (bbl.)	2,776,271	2,195,184	9,556,911	44,233,795	1,426,897	1,224,790
Purch., re-run (bbl.).	132,049	1,211,750	669,718	4,932,762	159,121	120,237
Gasoline (gal.)	34,418,296	50,570,078	65,873,412	556,278,689	18,267,054	14,224,372
Kerosene (gal.)	22,600,912	11,866,510	14,932,890	215,203,459	6,942,047	5,885,600
Gas and Fuel (gal.)	39,287,020	47,342,239	277,488,680	921,606,114	29,729,229	26,895,976
Lubricating (gal.)	3,173,869	1,887,206	5,661,602	87,340,814	2,817,446	2,450,690
Wax (lb.)	1,105,477	2,802,841	47,300	33,817,105	1,090,874	1,234,348
Coke (ton)	8,547	5,937	.....	59,028	1,904	1,689
Asphalt (ton)	22,999	542	30,462	197,880	6,383	4,939
Miscellaneous (gal.)	13,425,170	25,398,460	51,816,160	141,673,965	4,570,128	3,021,193
Losses (bbl.)	49,115	89,947	158,090	1,613,414	52,046	57,961

Company and Address—	Plant Location	Capacity in Barrels	Running First of Year
Thrall Ref. Co., Thrall	Thrall	400	*
Tidal Western Oil Corp., Tulsa.	Burkburnett	2,500	2,000
Tiger O & R Co., Breckenridge.	Breckenridge	200	*
Trans-Atlantic Ref. Co., Houston	Houston	2,000	2,000
Transcontinental Oil Co., Ft. Worth.	Ft. Worth	5,000	4,000
Travis Ref. Co., Burkburnett.	Burkburnett	750	400
Turnbow Oil Ref. Co., Houston	Houston	500	*
Uniform Gasoline & Pet. Co., W. Falls	Burkburnett	4,000	*

* Shut down.

Company and Address—	Plant Location	Capacity in Barrels	Running First of Year
Victor Ref. Co., W. Falls	Burkburnett	1,500	*
Virginia Ref. Co., Ft. Worth (leased by Lewis O. Corp)	Dublin	2,500	*
Waco Ref. Co., Waco	East Waco	5,000	*
Waggoner Ref. Co., Electra	Electra	2,500	2,500
Walker Consolidated Pet. Co., Dallas	Iowa Park	3,000	*
Weatherford R. Co, Weatherford.	Weatherford	500	*
White Eagle O & k Co, Ft Worth.	Ft Worth	5,000	3,750
Wier, A. H., Tiffin	Tiffin	300	*
World Ref. Co., Ft. Worth	Bridgeport	500	*
Wortham Ref. Co., Wortham	Wortham	400	60

Marketing Company Is Organized at Dallas

Dallas, Texas.—The Amicable Petroleum Company has been founded by Tom C. Moss and W. I. Corlett, formerly with the local offices of the Acme Petroleum Company, to do a general marketing business in all grades of petroleum products with offices located at 907 Magnolia building. The new concern has been incorporated under the laws of Texas, and has adopted a trademark to be known as "Ampeco" for its products. Mr. Moss is well known in Mid-Continent marketing and refining circles, and claims the distinction of opening up the first marketing office in Texas which was for the Gustafson & Spencer Company.

Tabor Now in Charge of Marcus Hook Refinery

Tulsa, Okla.—George H. Taber, Jr., formerly president of the Sinclair Crude Oil Purchasing Company, is now in charge of the Marcus Hook refinery now being completed by the Sinclair Consolidated Oil Corporation. Headquarters of the new refinery will be in Philadelphia.

Mr. Taber is succeeded as president of Sinclair Crude Oil Purchasing Corporation by Henry L. Phillips, former vice president. Both men have been with the organization since 1916. Mr. Taber is a graduate of Massachusetts Institute of Technology, entering the services of the company in the engineering department. Mr. Phillips was in the legal department for several years.

New Absorption Plant Planned for California

Los Angeles, Cal.—The Santa Fe Carbon Company is scheduled to start construction work on an absorption gasoline plant at Long Beach at an early date, and plans to put in equipment for the manufacture of carbon black from the stripped gas. It is said that this is the first attempt that has been made to manufacture carbon black from California gas.

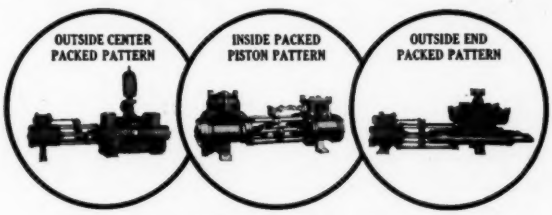
The Transporting Refining Company, Tulsa, Okla., has been incorporated by Herbert Storck, formerly with the MacKormack Oil Company. Mr. Storck will be assisted in the new company by W. G. Teaney and H. B. Huddleston, former associates of the MacKormack Company.

STOCKS ON HAND AT THE REFINERIES OCTOBER 31, 1922

1922	East Coast (N.Y., Phila. & Balt.)	Pa., N. Y., East Ohio & W. Va.	W. Ohio, Ind., Ill., Ky. & Tenn.	Oklahoma & Kansas	Texas
Crude Oil (bbl.)	9,807,550	1,112,804	822,094	2,442,350	8,318,380
Oils purch. to be re-run (bbl.)	313,282	39,967	194,834	3,693	28,954
Gasoline (gal.)	144,876,642	17,065,482	87,507,622	128,493,078	99,376,480
Kerosene (gal.)	87,220,544	10,645,329	26,711,708	35,167,820	51,029,221
Gas and Fuel (gal.)	299,205,749	25,314,907	34,570,420	120,670,145	325,108,351
Lubricating (gal.)	92,209,133	36,388,434	17,783,885	11,803,287	42,943,819
Wax (lb.)	52,569,190	27,527,243	22,277,157	8,236,734	10,956,977
Coke (ton)	14,366	233	5,407	3,465	5,236
Asphalt (ton)	68,639	3,259	7,604	189	9,605
Miscellaneous (gal.)	166,843,907	39,166,102	63,518,805	66,815,388	210,882,720

	Louisiana and Arkansas	Colorado & Wyoming	California	Total stocks end of Oct. 1922	Total stocks end of Oct. 1921
Crude Oil (bbl.)	4,509,555	2,811,609	2,941,500	32,765,842	18,404,182
Purch. to re-run (bbl.)	207	166,663	472,503	1,220,103	1,134,886
Gasoline (gal.)	94,057,997	83,019,158	69,187,603	723,584,062	456,269,365
Kerosene (gal.)	14,529,555	6,652,361	24,302,894	256,259,432	334,579,774
Gas and Fuel (gal.)	240,644,081	32,514,771	290,720,456	1,368,748,880	1,238,269,365
Lubricating (gal.)	2,634,628	2,318,850	11,693,088	217,775,124	216,770,320
Wax (lb.)	82,752,280	2,814,904	722,137	207,856,622	223,013,334
Coke (ton)	.....	4,751	.....	33,458	64,413
Asphalt (ton)	14,690	456	10,434	114,876	87,262
Miscellaneous (gal.)	98,229,249	54,900,212	112,967,000	813,323,833	662,272,028

DURABLE DUPLEX STEAM PUMPS



NEW YORK SALES OFFICE, 141 BROADWAY
Send for Catalog No. 107

DEAN BROS. STEAM PUMP WORKS. INDIANAPOLIS.

PIONEER TANK & BOILER CO.
FORMERLY
TULSA BOILER AND SHEET IRON WORKS
ENGINEERS MANUFACTURERS AND ERECTORS
OIL REFINERY WORK STORAGE TANKS BOILERS SUPPLIES AND REPAIRS
STEEL PLATE CONSTRUCTION
STACKS, RIVETED PIPING, PRESSURE TANKS, ETC.
BOX 1926 - TULSA, OKLA.

PIONEERS IN MID-CONTINENT FIELD SPECIALIZING ON CRUDE STILLS, AGITATORS, COND. BOXES VAPOR TOWERS AND ALL OTHER REFINERY TANKAGE

Magnolia Now Has 120 Stills at Beaumont

Beaumont, Texas.—The Magnolia Petroleum Company has added 20 stills in its Beaumont refinery, which now gives it a battery of 120 cracking stills. Ten of the new stills have been installed while the others are on the ground.

Ringling Refinery Sold To Gilmer Oil Company

Ringling, Okla.—The plant of the People's Refining Company, Ringling, Okla., has been sold to the Gilmer Oil Company and will begin operations as soon as necessary repairs have been made. E. D. Priddy of Ardmore, Okla., manager and in charge of operations.

The company's Healdton production, which is approximately 375 barrels a day, will be run by the new plant.

Which Are You?

Two men were standing in the street. The Christmas chimes rang out. "Aren't those chimes beautiful?" one man asked the other.

"What did you say?" replied his companion.

"Aren't those chimes beautiful?" he repeated.

"Those damn bells are making so much racket I can't hear a word you're saying," was the answer.

Actual Unretouched Photograph

36,000 Rivets Driven With This Ketler Rivet Set

Some record, you say, yet it is nothing unusual for a Ketler Rivet Set. Users drive anywhere from 5,000 to 50,000 rivets right along with this remarkable set.

A special steel—new heat treating process—careful hand forging—are the reasons why Ketler Rivet Sets drive from 10 to 100 times the usual number of rivets. YET THEY ARE NO HIGHER IN PRICE.

Don't take our word for these figures. Send in a small order, say a half dozen sets, and test them yourself.

Send for our 96 page catalog

KETLER-ELLIOTT CO.

High Grade Structural Tools

3159 So. California Avenue,

Chicago, Illinois

New Refining Company Chartered in Oklahoma

Oklahoma City, Okla. — The Hewitt Refining Company of Ardmore, capital $100,000, has been granted a charter by the Secretary of State. Incorporators are C. E. Sykes, J. A. Heenan and R. W. Coe, all of Ardmore, Chas. Pfile and Edward E. Stewart of Wichita Falls.

Charter also has been granted the Rolaway Drilling Company of Okmulgee, capital $10,000. Incorporators are E. E. Buckholts, Charles P. Webb and Elwood Taylor, all of Okmulgee.

Tidal Starts Operating Fox-Bush Gasoline Plant

Tulsa, Okla.—The Tidal Refining Company's Gasoline plant, which has been under construction in the Fox-Bush pool near Douglass, Kansas, since July 1, is now operating but the full capacity will not be reached until all gathering lines are completed.

The plant is designed to handle around 10,000,000 feet of gas a day by the low pressure absorption method.

New Plant Reported For Wyoming Fields

Casper, Wyo.—L. C. Stevenson and associates are reported to be making preparations for the construction of a refinery near Shelby. No information as to the size or type of the plant has been made public. Mr. Stevenson recently organized the Sunburst Consolidated Royalties, which controls considerable acreage in Rocky Mountain district.

To Increase Capacity of Hursch Company's Plant

Los Angeles, Cal.—The daily capacity of the Hursch Refining Company's plant at Long Beach, will be increased from 1000 barrels a day to 2500 barrels a day, according to announcement. The company is said to have made recent acquisition of additional crude oil supplies from producers in the local field.

Opportunity

Opportunity is just a fancy name for hard work.—Jack Dionne.

Refining Activities in the Mountain States

(Continued from Page 20)

Erected in 1920 to run on Osage crude. Skimming plant. Charging capacity 250 barrels.

U. S. Oil & Refining Company.—At Moorcroft and on Burlington. Practically completed. Skimming plant. To have charging capacity of 250 barrels.

Riverton-Wyoming Refining Company.—At Riverton on Wind River and on Northwestern railroad line. Erected in 1918. Runs on Hudson, Dallas, and Pilot Butte crudes. Sold about a year ago to Riverton bank to satisfy debts. Skimming plant. Capacity, 500 barrels. Not operating.

Wind River Oil & Refining Company.—At Lander. Constructed in 1918. On the Popo Agie river and on the Northwestern railroad. Runs on Dallas and Hudson crudes. Skimming plant. Capacity about 750 barrels. Not operating.

Wyatt Oil & Refining Company.—Located near Fetterman on North Platter river, and Northwestern railroad. Uses Brenning Basin crude, being connected by four mile line. Skimming plant. Capacity nearly 500 barrels. Not operating.

Ohio Oil Company.—Situated in the Grass Creek field. It was erected in 1920. It is a topping plant used in obtaining gasoline to mix with compressor stock in order to ship without loss through evaporation. Two stills and runs about 300 barrels of gasoline blend.

Texas Company.—Located two miles east of Casper on North Platte river and on Burlington and Northwestern lines. Will be completed some time in February or March. Original capacity to be 6,000 barrels, with possibilities of increase as soon as demand is justified. Built, it is understood, to supply Texas Company service stations in Rocky Mountain region with gasoline and some of by-products. Will get Salt Creek crude through line of Central Pipe Line Co., the latter line being completed and operating. Refinery has tank farm of 64,000 barrels capacity.

Southwest Oil Company.—Near Thornton. Built in 1917. Plant has small upright boiler as still. Crude obtained from Wakeman field in Crook County. Capacity only 10 barrels. Output sold locally.

Colorado

Apex Refining Company.—Located near Loomis station on the Colorado & Southern railroad near Boulder. Built about 10 years ago. Runs on crude from nearby shallow wells and tank car shipments. Skimming plant. Capacity 250 barrels. May be converted into shale oil refinery.

Raven Oil & Refining Company.—At Rangely, northwestern part of state. Built in 1920. Runs on crude from shallow nearby wells. Skimming plant. Capacity 200 barrels. Sold locally.

United Oil Company.—Located near Florence on Denver & Rio Grande railroad. Erected about 12 years ago. Uses crude from Florence field and from tank car shipments from Wyoming. Capacity of about 1,500 barrels. Is complete small refinery.

Montana

Arro Oil & Refining Company.—At Lewistown, built in 1921. Is on Chicago, Milwaukee & St. Paul railroad. Skimming and lubricating oils manufactured. Valued at $175,000, making it largest and most expensive plant in state. Operates on Cat Creek crude. Capacity 1,500 barrels.

Lewistown Oil & Refining Company.—At Lewistown. It was erected in 1921 at cost of $100,000. This company received contract for government's royalty oil last month and plans are being made to construct a large topping plant which will increase the capacity of the plant from 500 to 1000 barrels daily. It is understood that this company also owns the plant at Billings, known as the Montana Refining Company's refinery. This gives the Lewistown Company 1,500 barrels refining capacity with which to handle its big government contract. Skimming plant, at present.

American Refining Company.—At Great Falls on the Great Northern railroad completed the latter part of 1922 at a cost of $150,000. Uses Kevin-Sunburst crude. Is running 600 barrels daily now. Plant capacity is more than 1200 barrels per day. Uses Soyston type of works.

Miles City Oil & Refining Company.—Located in Miles City on the Northern Pacific railroad. Skimming plant, using Gillons type of works. Operates on Cat Creek crude. Running 500 barrels now, per day. Daily capacity, 2000 barrels.

Montana Refining Company.—Located at Billings, on Northern Pacific and several other transcontinental lines. Skimming plant. Running 500 barrels daily. Operates on Cat Creek crude. Daily capacity, 1000 barrels.

Weowna—At Winnett, built during last year. Skimming plant. Runs from Cat Creek. Capacity about 250 barrels.

Miles City Refining Company.—Miles City, built recently. Skimming plant. Runs from Cat Creek. Capacity nearly 300 barrels.

Utah

Standard—At Salt Lake City. Cracking plant. Takes oil from Utah Oil Refining Company, 2500 barrels daily capacity.

Utah Oil Refining Company.—Located at Salt Lake City. Erected in 19— A subsidiary of the Midwest Refining Company. Wax plant in connection, and complete refinery. Crude supply obtained in tank cars from Wyoming oil fields. Has charging capacity of 6000 barrels.

Dixie Oil Company.—Located at Virgin in the southwestern part of the state. Finished for operation in 1921. Skimming plant. Crude requirements obtained from nearby shallow wells. Charging capacity of 100 barrels.

OIL REFINERY EQUIPMENT

Crude and Steam Stills Condenser Boxes
Agitators Tanks Towers
Walkways and Stairs

Large Stocks of Materials Prevent Delays
Efficient Shop Service

MASHER

STEEL AND MACHINERY COMPANY
DALLAS, TEXAS

÷ REFINERY SUPPLIES ÷

Continued Strength Shown in Chemicals

Chicago, Ill. Jan. 6.—The market for chemicals used by refiners appears to be stronger generally than a month ago. The demand for caustic soda is reported as stronger for this period than in several years. Consumers consider present prices, which represent a slight advance over the price of thirty days ago, attractive—and the demand on contract is reported enormous. That cost of production is claimed to be steadily mounting has helped to encourage contract buying.

Chlorate of soda has advanced about a quarter of a cent. Foreign supplies are reported as very light and foreign prices as rising. Nitrate of soda is five cents higher per hundredweight, and potash permanganate a half cent higher. Other chemicals remain at former prices—but all are finding an unusually good demand for this season.

Benzol came back into the market during the month, and producers believe they will be able to supply a moderate demand henceforth. At periods during December they were swamped with demand, but at present supplies are available, for small quantity orders. Prices quoted vary from 30 to 40 on pure white, and from 27 to 37 on 90 per cent.

Linseed oil has advanced three cents during December, and a firmer tone has been apparent in all animal and vegetable oils. The linseed oil advance is attributed to improving demand in the paint and linoleum industries, and to unfavorable reports from Argentine regarding the flaxseed crop, which is said to have been injured by cold weather.

The stagnation which usually prevails in the animal, vegetable, and fish oil market at this time of year has been notably absent. Corn oil is one to two cents higher, due to better demand. Red oil is slightly higher, manufacturers reporting increased costs of raw materials. Menhaden and herring oils have advanced. Other oils do not show price advances, but are experiencing considerable activity.

Naval Stores Decline

Turpentine is selling at four cents lower than December 1st. Buying is conservative as further declines from the abnormal prices recently reached are expected. Early in the month the price rallied for a few days due to a short period of activity. Foreign stocks are reported large, and prices will probably remain at present levels or see further declines.

Rosin prices have declined in sympathy with turpentine, despite a very fair demand.

Other naval stores have not changed in price, and are in normal demand.

OIL JOBBERS SUPPLIES

Prices based on original packages in large quantities f. o. b. manufacturing points—unless otherwise specified.

Animal, Fish and Vegetable Oils
(Quotations by Falk Company, Chicago)

Lard Oils—	Prices Jan 1
Prime, bbls., lb	.15
Extra Winter Strained, bbls., lb	.13½
Extra, bbls., lb	.13¼
Extra No. 1, bbls., lb	.12½
No. 1, bbls., lb	.11¾
No. 2, bbls., lb	.11¼
Tallow, prime edible, lb	.09½
Tallow Oil, acidless, bbls., lb	.12

	Prices Jan. 1	
Lard Stearine bbls., lb	.12¼	
Oleo Stearine, bbls., lb	.10	.10¼
Neatsfoot Oil—		
Pure 20 cold test, bbls., bl	.16¼	
Pure 30, cold test, bbls., lb	.14¼	
Extra, bbls., lb	.12½	
No. 1, bbls., lb	.11½	
Horse Oil, bbls., lb	.6½	0.6¼
Red Oil, distilled, bbls., lb	.10½	
English Degras, bbls., lb	.4½	.05
Domestic Degras, bbls., lb	.4¾	.05
Menhaden Fish Oil—		
Light Pressed bbls., gal	.64	.66
Yellow bleached, bbls., gal	.67	.69
Herring Oil, tanks, coast, gal.	.40	.45
Whale Oil, bleached, bbls., gal	.75	
Sperm Oil, bleached, bbls., gal.	.99	1.04
Soya Bean Oil, pressed, bbls., lb	.12	
Soya Bean Fatty Acids, tanks, West, lb.	.10¾	.11
Tallow Fatty Acids, bbls., lb.	.07	.07½
Castor Oil—		
No. 1, bbls., lb	.12½	
No. 3, bbls., lb	.12	
Corn Oil—		
Middle West, tanks, lb	.9½	.09¾
Cooperage, l. c. l.	.10¾	
Linseed Oil—		
Carloads, bbls, gal	.86	.90
Less than 5 bbls., gal	.95	

NAVAL STORES

(Quotations by National Rosin Oil & Size Company, Chicago.)

Rosins—		
B to I, bbls., (280 lbs.)	6.20	6.30
10-20 bbl. lots, f. o. b. shipping point	7.30	...
K to WW bbls. (280 lbs.)	6.50	8.00
10-20 bbl lots, f. o. b. shipping point	7.60	9.10
Turpentine, spirits ex yard gal.	1.47	
In drums	1.52	
Rosin Oil, first run, gal.	.45	
Rosin Oil, second run, gal.	.47	
Rosin Pitch, bbl	6.00	
Tar, kiln burned	12.50	
Tar, retort	11.00	

REFINERS' SUPPLIES

Prices are based on original packages, in large quantities, and represent spot quotations, unless otherwises stated, f. o. b. manufacturing points.

(Quotations by Wishnick-Trumpeer Chem. Co., Chicago)

Soda Ash, light bags, cwt.	1.75	2.10
Silicate of Soda, 60 deg., tanks, cwt.	1.75	
Sal Soda, cwt.	1.10	1.30
Caustic Soda, 76%, drums, cwt.	3.60	3.75
Chlorate of Soda, kegs, lb		.07
Nitrate of Soda, cwt.	2.60	
Potash Permanganate, lb	15¾	.16½
Potash Bichromate, sacks, lb.	.09¾	.10
Sulphuric Acid, 66 deg., tank cars, ton	.14	.16
Acetic Acid—		
28%, bbls, lb	.03¼	.04
56%, bbls., lb	.06¼	.07
80%, bbls., lb	.09¾	.10¼
Fullers Earth, 16-30 mesh, carloads, ton	23.00	25.00
Chloride of Lime, cwt.	2.00	2.25
Benzol, pure, water white, gal.		.30
Benzol, 90%, gal	.30	.40
Toluol, gal.	.27	.37

PIONEER TANK & BOILER CO.
FORMERLY
TULSA BOILER AND SHEET IRON WORKS
ENGINEERS MANUFACTURERS AND ERECTORS
OIL REFINERY WORK
STORAGE TANKS
BOILERS SUPPLIES AND REPAIRS
STEEL PLATE CONSTRUCTION
STACKS, RIVETED PIPING, PRESSURE TANKS, ETC.
BOX 1926 - TULSA, OKLA.
PIONEERS IN MID-CONTINENT FIELD SPECIALIZING ON
CRUDE STILLS, AGITATORS, COND. BOXES
VAPOR TOWERS AND ALL OTHER
REFINERY TANKAGE

Prepare Now *for* Big 1923 Business

Since early summer our "ads" have foretold developments in the tank car situation. These predictions have proven not only correct but conservative.

We now believe that the industry's combined tank car output for 1923 will hardly exceed one-fifth of the trade's requirements—one car to every five wanted.

Large orders for next year's production have already been booked, and others are pending, but we can still offer much quicker delivery than will be possible later.

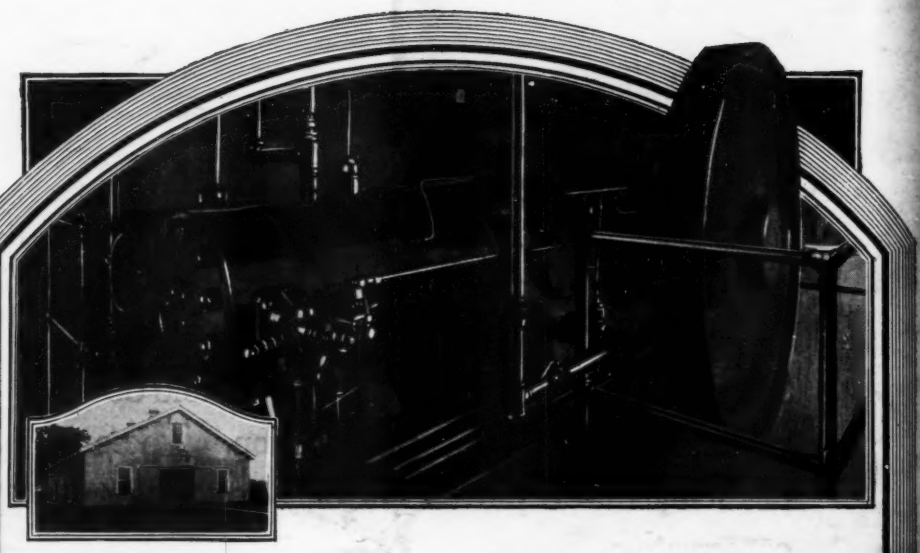
As prices will be higher, due to advancing cost of materials, we urge our customers to cover for their requirements at once.

American Car and Foundry Company

New York
165 Broadway

Chicago
Railway Exchange Building

St. Louis
915 Olive Street



Yes, they stand the gaff of service—

THERE are no "weak sisters" in the Bessemer line. Each model offered you and each engine shipped is designed and built for steady use without interruptions.

For example, we furnished The Gypsy Oil Company with a 50 H.P. Bessemer Gas Engine back in 1917. It was promptly put into service and, (just to prove Bessemer quality in good, convincing fashion) *went through its whole fifth year without a stop!* And even then it only stopped because the gas supply was shut off.

Breaking the world's record non-stop run doesn't mean that this engine was an extra good Bessemer—it merely means that the owners happened to realize its good performance and told us about it.

Nevertheless, facts like this are mighty reassuring to any prospective buyer of oil field equipment.

Mention your need and we will be glad to forward the proper catalog.

THE BESSEMER GAS ENGINE COMPANY
18 York Street Grove City, Pa.

BESSEMER

BESSEMER OIL FIELD ENGINES – COMPRESSORS VACUUM PUMPS – ROLLER PUMPING POWERS

Service Branches in Chief Production Centers

XUM